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Vol. XXII. Part 6.

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The Journal of the Department of Agriculture of Victoria, Australia.

June, 1924.

PRINCIPAL CONTENTS

Beet Sugar Industry

Burnley Egg-Laying Competition

Potato Production under Irrigation

Herd Test Quarterly Report

Duck Rearing

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CONTENTS.—JUNE, 1924.

		PAGE
The Beet Sugar Industry	*W. L. Williams*	321
Burnley Egg-Laying Competition—Report for 1923-4 ...	*W. C. Rugg*	326
Warracknabeal Crop and Fallow Competition, 1923	*L. C. Bartels*	342
Goroke Fallow Competition, 1924	*R. S. McTaggart*	348
Numurkah Crop and Fallow Competition, 1924 ...	*H. A. Mullett, B.Ag.Sc.*	350
Potato Production under Irrigation	*J. T. Ramsay*	355
Standard Herd Test—Report for Quarter Ended 31st March, 1924		361
Breeding and Management of Ducks	*H. F. Clinton*	372
Protection of Useful Insects, Birds, and Animals		379
Orchard and Garden Notes	*E. E. Pescott, F.L.S.*	382
Reminders for July		384

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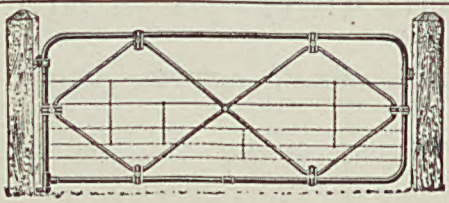

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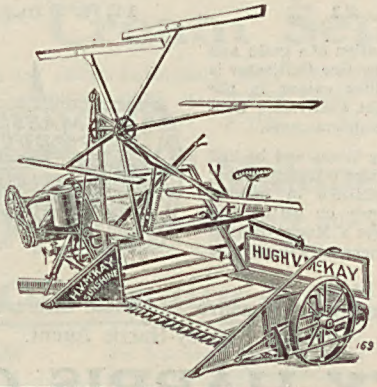

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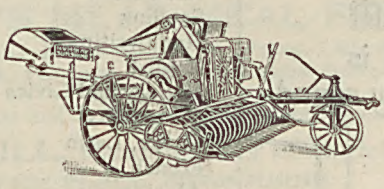

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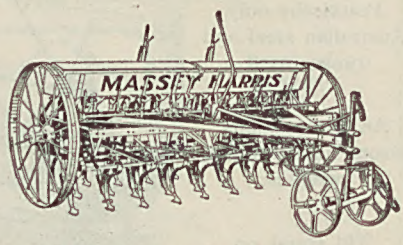

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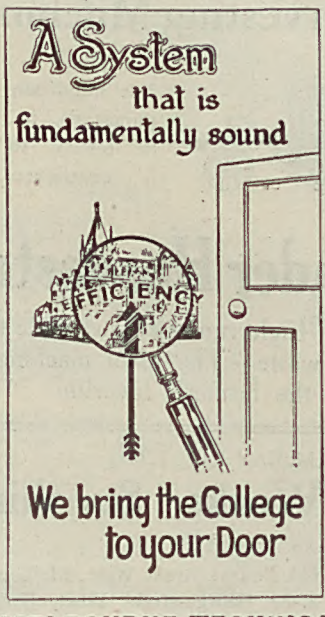

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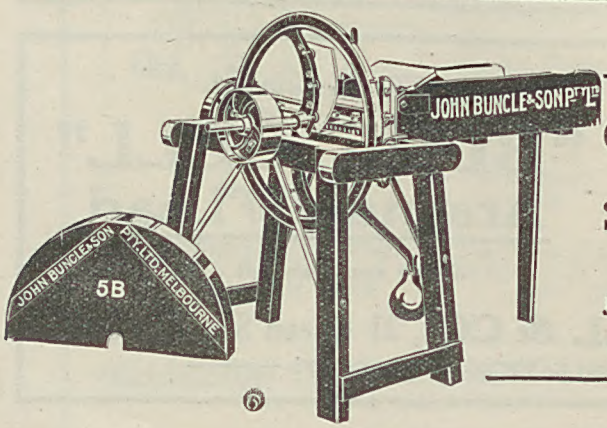

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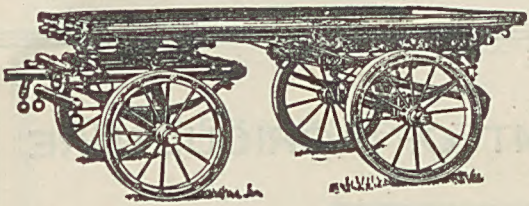

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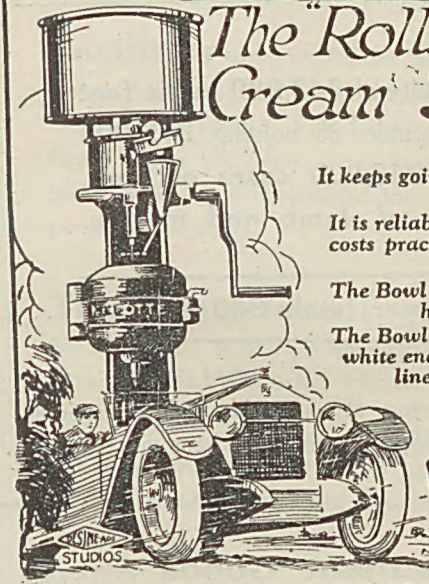

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OF THE

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OF

VICTORIA.

Vol. XXII. June, 1924. Part 6

NATIONAL MUSEUM MELBOURNE

THE BEET SUGAR INDUSTRY.*

By W. L. Williams, Manager, Maffra Sugar Factory.

First of all, let me ask, are you interested in the beet sugar industry merely as an item in your programme, or are you interested in it as a real live possibility for combining primary production and a secondary industry, which may bring great economic advantage to individual, district, State, and nation?

To set you thinking, let me say that the Maffra beet fields last year covered only an area of 2,000 acres, yet gave employment in field and in factory to 400 men, and produced £100,000 worth of sugar and by-products.

Is this industry worth practical consideration? Great Britain for a long time thought not, but the war opened her eyes to the advantage of home-grown sugar and an industry that would stabilize and develop first class agriculture as no other could. Consequently, large amounts of capital were invested in two factories, and after many difficulties these are well on the road to success, first class profitable crops of beet are now grown, and several additional factories are contemplated at an early date.

The Industry in Europe and America.

Now let me touch very lightly on the rather remarkable history of the beet sugar industry.

One hundred and twenty years ago it was started in Germany and France. At the beginning of the nineteenth century, after much research, it was found that beets under scientific selection and training could be influenced to give remarkably improved yields of sugar. Probably no plant has been so wonderfully and favorably modified

* Paper read at the Farmers' Annual Convention, Benalla, April, 1924.

immediately after the final cultivation, so that weeds may have no advantage whatever. Seed is sown in 18-inch rows at the rate of from 12 to 14 lbs. per acre, and in this country superphosphate should generally be added at from 1 to 2 cwt. per acre.

Although beets absorb a lot of potash, the rich and comparatively dry Maffra soils have not yet shown any necessity for its addition.

The beets are planted from September to December, and as soon as the young plants show through they should be rolled and cultivated with the special four-row beet cultivators. When four leaves are developed, thinning should commence. This is done with a short hoe and by hand, and beets are left at spaces of 8 to 12 inches. Thinning is usually carried out by contract at £2 per acre. Later on the beets should be side-hoed by hand, and cultivation be continued repeatedly right up to harvest time. Most of our growers do not as yet cultivate sufficiently.

Irrigation, to be successful, must be applied before the beets wilt, and the water should be conveyed through furrows rather than by flooding. In heavy lands too much care cannot be exercised to avoid free water remaining in the soil or sub-soil, as the beet, while fond of moisture, is a deep rooter, and very sensitive to excess water. If the sub-soil is not free, under-drainage is necessary, and irrigation should always be associated with prompt cultivation.

Beet harvesting usually extends from March to June. The beets are loosened with special lifters, and labourers contract to top off the leaves and crowns at so much per ton. The grower then carts the beets to the nearest siding or factory, and delivers them for manufacture. The tops are worth, on an average, the rental of the land, and there is scarcely any better feed for fattening sheep.

Good cultivation and rotation are very important, and the industry is certainly not one for careless farmers. Because of the good cultivation demanded, and the deep rooting propensities of the plant, it also improves the soil to a remarkable degree for most other crops.

The costs of growing beets vary a great deal, and are influenced by so many conditions, that nothing but a general estimate can be given.

COST OF A 12-TON CROP PER ACRE.

Interest or rent of land	£2 0 0
Ploughing, cultivation, seeding, and fertilizer	2 12 6
Thinning and hoeing	2 15 0
Inter-tillage	0 12 6
Lifting and topping a 12-ton crop	2 15 0
Delivery of beets	2 5 0
Total cost per acre	£13 0 0
Value of crop at 35s.	£21 0 0
Value of crowns and tops for stock feed	2 0 0
	£23 0 0
Net profit per acre	£10 0 0

A grower should earn a large amount of the stated costs himself, and larger yields are frequently procured.

Why the Industry should be Encouraged.

Over a long term of years Queensland has endeavoured to meet Australia's sugar requirements, but on very few occasions has sufficient been produced to do so. The demand is constantly increasing, indicating that there is room for further supplies of cane sugar in the North and beet sugar in the South. Australia has great need of secondary industries such as this, which will take the primary products and resolve them on the spot to valuable food products available for home consumption.

The beet industry promotes closer settlement, intense culture, increased production and wealth, and opens up valuable avenues for labour right in the country districts. Further, the whole of the by-products strongly support the stock-feeding interests.

To those of you who are interested, it might be advisable to give the probable cost of an up-to-date beet sugar factory.

A factory capable of treating 500 tons of beets a day is a most desirable unit for Australian early-day conditions. Such a factory would have to be fed from about 4,000 acres, and its annual output would be at least 40,000 tons of raw material. A factory of this size would cost, say, £200,000, plus operating capital, and a good deal of the plant could be manufactured in Australia. The operating costs and revenue might be approximately:—

Overhead Expenses, including—	£
Interest, depreciation, salaries, insurance	25,000
Factory repairs	3,000
Manufacturing costs, 40,000 tons beets at 35s.	70,000
Wages	15,000
Coal, limerock, supplies, freight, &c.	18,000
Total	£131,000

Revenue—	£
Sales—Sugar, 4,800 tons at £30	144,000
Molasses and beet pulp	7,000
Total	£151,000
Balance, profit	£20,000

Out of this amount some provision would have to be made for interest on operating capital.

To-day sugar is worth £36 a ton, but the world's market price for refined sugar is above this figure.

A great many points and details of interest must necessarily be neglected in the limited time at my disposal, but I have no hesitation in commending the beet sugar industry to you as a most valuable and desirable asset for our southern States—yet one that should be adopted in any new district with great caution, but which, when adopted, should be pursued with great vigour and determination.

BURNLEY EGG-LAYING COMPETITION.

Results for 1923-24.

By W. C. Rugg, Chief Poultry Expert.

The Thirteenth Egg-laying Competition, which commenced on 1st April, 1923, and concluded on 31st March, 1924, will long be remembered owing to the very unfavorable weather during the greater period of the test. Yet the scores obtained must be considered highly satisfactory. The results should once and for all silence those who have voiced the opinion that the Burnley Gardens, owing to their position and the nature of the soil, are not a fit place in which to hold such a competition. The fact that the competing teams made the fine scores they did speaks well for the skill of the Victorian breeders, more especially when it is remembered that the team results were obtained, not under the

Messrs. Herbert Bros.' Black Orpingtons.—Winners in Class 3, Section A. Laid 1,613 eggs in twelve months.

sheltered conditions of single-pen sheds, but under genuine team conditions, that is, six birds in a yard where they spent most of their time exposed in all weather conditions—sun, rain, and wind—and the only time they were under cover was when they were roosting at night. Further, for the biggest portion of the year their run was on wet ground. These are the birds that will breed good strong virile stud stock. As long as we have poultrymen who can rear such birds, Victoria need not fear any serious deterioration in the stamina of her flocks.

The Burnley Competition, as conducted under Government supervision, is of very great value to the poultry industry, and it stands today in the same relationship to it as the Royal Agricultural Show does to the breeder of horses and cattle, inasmuch as it sets the standard and indicates to the poultry-farmer the possibilities of the industry, and, in addition, it is the means of distributing stud stock (bred from

birds with authentic scores) throughout the Commonwealth. The high esteem in which the Government competition is held is evident by the fact that for the 1924-25 competition the pens were over-applied for, necessitating a ballot.

The Danger of Small Eggs.

I would appeal to all poultrymen to give thought to the question of size of egg. The day is not far distant when our export trade must receive more serious consideration. We have in Victoria probably the best climate in the world for the production of every class of food needed for the best development of all classes of poultry, and the production of large numbers of eggs. There is an almost unlimited demand for eggs in England, but unless our breeders can offer eggs of the right size, namely, 2 ounces or over, we can never take advantage of that market. Some breeders have proved over and over again that they can breed birds with pace second to none in the world, and many of them

Mr. M. G. Leech's White Leghorns.—Winners in the Wet Mash Class. Laid 1,438 eggs in twelve months.

also make a specialty of size of egg, but others do not. I can assure poultrymen that the greatest danger to their industry to-day is the under-sized egg. But if they will make a firm stand now, and refuse to incubate an egg that does not weigh at least 2 ounces, and never use a male bird in their breeding pen whose mother did not lay a 2-ounce egg, these precautions, in conjunction with hatching at the right time of the year (which is the spring only), feeding the chickens on good plain nourishing food without forcing, proper brooding and environment, they will soon stamp out the small-egg trouble, and be able to take full advantage of an export trade.

The rule under which any bird whose eggs during the month of July do not attain an average weight of at least 2 ounces may be disqualified will be again strictly enforced at this year's competition.

On pages 335-6 there is printed a table showing the average weight per dozen of all eggs laid by each team in the four classes of section A during the whole period of the 1923-24 competition.

Mr. W. Cullen's Black Orpington.—Winner in Class 4, Section B. Laid 338 eggs in twelve months.

Mr. G. McDonnell's White Leghorn.—Winner in Wet Mash Class, Single Test. Laid 304 eggs in twelve months.

Comments on the 1923-24 Competition.

The two most gratifying features of the 1923-24 competition are—first, the number of very high individual scores. No less than twelve birds in the different classes laid 300 eggs or over for the twelve months. The second feature was the fine type and quality of the birds that made these high scores. Messrs. Cullen, Eastaugh, Herbert Brothers, and C. C. Dunn's Black Orpingtons, and Messrs. Ryan and McDonnell's White Leghorns stand out as probably the best specimens of these breeds that have been seen at Burnley.

It is pleasing to record the success of a returned soldier—Mr. M. G. Leech, who has an up-to-date poultry farm at Sydney-road, Campbellfield. He has been in the business only a little over four years, but by hard work and patience he has bred up a splendid flock of birds, and

Mr. J. Ryan's White Leghorn.—Winner in Dry Mash Class, Single Test. Laid 330 eggs in twelve months.

well deserved his win with his team of White Leghorns in section A (wet mash). Mr. D. Gibson, of Thornbury, was unfortunate in securing only second place in this section. For the greater period of the competition his team was in the lead, but in the last few weeks they fell behind, and finished with a total of sixteen less than that of the winners. I understand that these birds were laying for some time before the competition started.

In Class 2, White Leghorns (dry mash), Mr. N. Burston's team laid 1,516 eggs, and won by 120 eggs. In my report on the Winter Test in this *Journal* of last September, I mentioned that this team, together with those in pens 30 and 32, were the quality desired at competitions,

and it is these teams that have secured the three leading positions in their class. Even at the conclusion of the competition, Mr. Burston's birds were in wonderful condition, and from appearances I should say they would lay on for some time. For evenness and quality they were probably one of the best teams entered for any Burnley competition during recent years.

Mr. W. Burston's White Leghorns.—Winners in the Dry Mash Class. Laid 1,516 eggs in twelve months.

Messrs. A. Siede & Son's Langshans.—Winners in Class 4, Section A. Laid 1,310 eggs in twelve months.

Messrs. Herbert Brothers' team were easy winners in Class 3, Black Orpingtons (wet mash). Their total was 1,613 eggs—nearly 200 more than the total of the runners-up. These birds were of even quality and fine stamina, and should make ideal breeders. One of them laid 323 eggs—a splendid performance, considering that she was exposed to all weathers in an open yard. It would have been interesting to know how many eggs this hen would lay in a single pen. The winners in Class 4, Heavy Breeds (dry mash), were Messrs. A. Siede and Sons'

team of Langshans, which laid 1,310 eggs, and won by 124 eggs. It was a nice even team of good type.

In Section B, Class 1, Individual Birds, White Leghorns (wet mash), Mr. G. McDonnell's hen won with the good score of 304 eggs, and although this breeder has produced many winners, I do not think he has bred a better bird than this. She is of remarkable size, and weighed 5½ lbs. on the last day of the test. She is beautifully balanced, and of great quality. In Class 2, White Leghorns (dry mash), Mr. J. Ryan, of Silvan, registered his third win in this class. In the 1918-19 competition a bird entered by him laid 306 eggs, in 1919-20 another laid 303, and this year the hen entered by him laid 330. This bird is another splendid specimen of the breed.

Mr. L. Faulkner's Rhode Island Red.—Winner in Class 5, Section B. Laid 319 eggs in twelve months.

In Class 3, All Light Breeds other than Leghorns, Mr. H. Miller gained first and third place with Black Minorcas, with scores of 260 and 222 respectively. In Class 4, Black Orpingtons (wet mash), the bird entered by Mr. W. Cullen, of Werribee, won with the excellent score of 338 eggs, an average of over 28 eggs a month, and in about the middle of the competition she laid 99 eggs in as many days. She is of good colour, fine type, and the egg laid on the last day of the competitions weighed 2 7-16 ounces. The hen that secured second place was entered by Mr. T. L. Eastaugh. Her score was 321, and 100 of these were laid in as many days during the latter period of the test. In Class 5, All Heavy Breeds other than Orpingtons, Mr. L. Faulkner's Rhode Island

NATIONAL MUSEUM MELBOURNE

Red—a bird of good type and colour—won with a fine score of 319 eggs.

The number of high scores this year reflects the greatest credit on Mr. Macauley and his assistants, as, owing to the very unfavorable weather, the birds required extra care and attention, and the good condition of the competitors at the termination of the test was favorably commented on by many of the leading breeders.

Methods of Feeding.

It is the policy of the Department of Agriculture at the Burnley Competitions to feed the birds with only such foods as can be obtained by a poultryman in any part of the State. No condiments of any kind

Mr. H. Miller's Black Minorca.—Winner in Class 3, Section B. Laid 260 eggs in twelve months.

are used, nor are the birds forced in any way, the desire being that at the end of the test the birds may be returned to their owners in the best possible condition, and fit to go into the breeding pens the following season.

A list of the different kinds and quantities of the food fed to the birds during the currency of the competition is given hereunder:—Wheat, 422½ bushels; oats, 28 bushels; maize, 63 bushels; bran, 807 bushels; pollard, 1,151½ bushels; pea meal, 1 cwt.; grit, 2 tons; charcoal, 5 bags; onions, 5 bags; bullocks' heads, livers, &c. The total cost for feed was £323 13s. 3d.

The wet mash consisted of bran and pollard, equal parts by measure, mixed with soup made from bullocks' heads and livers; 20 per cent. chaffed greenstuff was then added. Minced raw onions at the rate

of 2½ per cent. of the mash was fed once a week. The dry mash consisted of equal parts by measure of bran and pollard, and three times a week ¾ oz. meat (minced livers and the meat off the bullock's heads) was fed to each bird. All birds had a plentiful supply of greenstuff throughout the test.

The grain fed during the first half of the test was 3 parts wheat, 2 parts oats, and 1 part maize. In the summer it consisted of 3 parts wheat and 1 part oats. Grit and granulated charcoal were always available.

The Financial Side.

The total number of eggs laid by the 545 birds that finished in the competition was 117,061, a fraction over 214 eggs per bird, which is an improvement on last year's average by six eggs per bird. The price realized for eggs averaged 1s. 9½d. per dozen. The cost of food averaged 2¾d. per bird per week. The return from sales of eggs averaged £1 12s. 0½d. per bird for the year, and the cost of feed averaged 11s. 10½d. per bird. Thus the profit over cost of food for the year averaged 20s. 2d. per bird.

PRIZE LIST.

For the greatest total number of eggs laid by a pen in each Class of Sections "A" and "B":—

Section A.—Group of Six Birds.—Trapnested.

Class 1.—Light Breeds.—Wet Mash.

1st Prize, Champion Certificate .. M. G. Leech, "Trevallyn" Poultry Farm, Sydney-road, Campbellfield (1,438 eggs).
2nd Prize, Government Certificate .. D. Gibson, 126 Dundas-street, Thornbury (1,422 eggs).
3rd Prize, Government Certificate .. Herbert Bros., Diamond Creek (1,406 eggs).

Class 2.—Light Breeds.—Dry Mash.

1st Prize, Champion Certificate .. N. Burston, 284 Glenferrie-road, Glenferrie (1,516 eggs).
2nd Prize, Government Certificate .. Ceres Stud (F. Gaskell), 17 Kelvin-grove, Armadale (1,396 eggs).
3rd Prize, Government Certificate .. Claud Langley, Kidd's Road, Dandenong (1,356 eggs).

Class 3.—Heavy Breeds.—Wet Mash.

1st Prize, Champion Certificate .. Herbert Bros., Diamond Creek (1,613 eggs).
2nd Prize, Government Certificate .. J. Wear, Werribee (1,419 eggs).
3rd Prize, Government Certificate .. C. C. Dunn, "Spero," Stud Poultry Farm, Moorabbin-road, Cheltenham (1,398 eggs).

Class 4.—Heavy Breeds.—Dry Mash.

1st Prize, Champion Certificate .. A. Siede & Sons, Pt. Nepean-road, Highett (1,310 eggs).
2nd Prize, Government Certificate .. C. C. Dunn, "Spero," Stud Poultry Farm, Moorabbin-road, Cheltenham (1,186 eggs).
3rd Prize, Government Certificate .. A. R. Boothman & Son, 25 Edinburgh-street, Richmond (1,126 eggs).

Section B.—Individual Birds.

Class 1.—Leghorns.—Wet Mash.

1st Prize, Champion Certificate .. G. McDonnell, 150 Camberwell-road, Auburn (304 eggs).
2nd Prize, Government Certificate .. Mrs. W. Pert, 124 William-street, Newport (300 eggs).
3rd Prize, Government Certificate .. J. B. Nicoll, Lake-street, Reservoir (297 eggs).

Class 2.—Leghorns.—Dry Mash.

1st Prize, Champion Certificate .. Jack Ryan, P.O., Silvan (330 eggs).
2nd Prize, Government Certificate .. H. W. Smith, Ethel-street, Preston (306 eggs).
3rd Prize, Government Certificate .. Norman Meyers, 48 Queen's-avenue, Caulfield (303 eggs).

Class 3.—All Light Breeds other than Leghorns.—Wet Mash.

1st Prize, Champion Certificate .. H. Miller, 64 Childers-street, Kew (260 eggs).
2nd Prize, Government Certificate .. Geo. Petterd, 130 Severn-street, Box Hill (245 eggs).
3rd Prize, Government Certificate .. H. Miller, 64 Childers-street, Kew (222 eggs).

Class 4.—Orpingtons, any colour.—Wet Mash.

1st Prize, Champion Certificate .. W. Cullen, Werribee Poultry Farm, Werribee (338 eggs).
2nd Prize, Government Certificate .. T. L. Eastaugh, Point Nepean-road, Moorabbin (321 eggs).
3rd Prize, Government Certificate .. T. L. Eastaugh, Point Nepean-road, Moorabbin (308 eggs).

Class 5.—All Heavy Breeds other than Orpingtons.—Wet Mash.

1st Prize, Champion Certificate .. L. Faulkner, 6 Normanby-street, Moonee Ponds (319 eggs).
2nd Prize, Government Certificate .. McCormack & Kinzel, 5 Wigton-street, Ascot Vale (286 eggs).
3rd Prize, Government Certificate .. H. Miller, 64 Childers-street, Kew (258 eggs).

For the greatest total number of eggs laid by individual birds in each Class of Section "A":—

Class 1.—Light Breeds—Wet Mash.

1st Prize, Champion Certificate .. W. Vercoe, Bayswater (305 eggs).
2nd Prize, Government Certificate .. L. F. Bush, 22 Edgevale-road, Kew (288 eggs).
3rd Prize, Government Certificate .. D. Gibson, 126 Dundas-street, Thornbury (280 eggs).

Class 2.—Light Breeds.—Dry Mash.

1st Prize, Champion Certificate .. Ceres Stud (F. Gaskell), 17 Kelvin-grove, Armadale (297 eggs).
2nd Prize, Government Certificate .. A. R. Boothman & Son, 25 Edinburgh-street, Richmond (287 eggs).
3rd Prize, Government Certificate .. Norman Meyers, 48 Queen's-avenue, Caulfield (281 eggs).

Class 3.—Heavy Breeds.—Wet Mash.

1st Prize, Champion Certificate .. Herbert Bros., Diamond Creek (323 eggs).
2nd Prize, Government Certificate .. C. C. Dunn, "Spero," Stud Poultry Farm, Moorabbin-road, Cheltenham (302 eggs).
3rd Prize, Government Certificate .. Herbert Bros., Diamond Creek (288 eggs).

Class 4.—Heavy Breeds.—Dry Mash.

1st Prize, Champion Certificate .. A. Siede & Sons, Pt. Nepean-road, Highett (262 eggs).

2nd Prize, Government Certificate .. A. R. Boothman & Son, 25 Edinburgh-street, Richmond (258 eggs).

3rd Prize, Government Certificate .. C. C. Dunn, "Spero," Stud Poultry Farm, Moorabbin-road, Cheltenham (251 eggs).

For the pen which shows the greatest average weight per dozen eggs laid:—

Section A.—Groups of Six Birds.—Trapnested.

1st Prize Government Certificate .. Wingood Poultry Yard (T. A. Goodwin), 8 Peel-street, Kew (24·817 oz. per dozen).

For the pen the eggs of which realized the highest market value throughout the competition:—

Section A.—Groups of Six Birds.—Trapnested.

1st Prize, Government Certificate .. Herbert Bros., Diamond Creek, 1,613 eggs; value, £11 11s. 0d.

Weight of Eggs.

Pen No.	Name.	No. of Eggs.	Weight of Eggs.	Average Weight of Egg.	Average Weight per dozen.
			oz.	oz.	oz.
	Class 1.—Light Breeds.—Wet Mash.				
1	H. Groves	1,327	2,628·5	1·981	23·769
2	W. Vercoe	1,329	2,666	2·006	24·072
3	S. C. Handley	1,178	2,338·5	1·985	23·822
4	R. R. W. Brown	1,207	2,409	1·996	23·950
5	Claud Langley	1,266	2,498·25	1·973	23·680
6	Mrs. T. Wilson	1,153	2,299·5	1·994	23·932
7	"Oreps" Poultry Farm ..	1,307	2,606·5	1·994	23·931
8	L. F. Bush	1,265	2,540·5	2·008	24·100
9	Brenda Clamp	1,332	2,652·5	1·991	23·896
10	H. Williams	1,047	2,082·5	1·989	23·868
11	G. Pocknall	1,269	2,542	2·003	24·038
12	Wanchai Poultry Farm	1,129	2,248·5	1·992	23·899
13	J. J. West	1,242	2,458	1·979	23·749
14	D. Gibson	1,422	2,835·5	1·994	23·928
15	Miss M. T. Kidd	1,111	2,206	1·986	23·827
16	Herbert Bros.	1,406	2,785·5	1·981	23·774
17	J. H. Chirnside	1,086	2,170	1·998	23·978
18	M. G. Leech	1,438	2,867·5	1·994	23·929
19	H. Schmutter	1,328	2,703	2·035	24·425
20	W. E. C. O'Neill	1,204	2,405·25	1·998	23·973
21	F. Wight	1,156	2,281·5	1·974	23·683
22	F. Telfer	1,096	2,173	1·983	23·792
23	A. J. Hill	1,404	2,844·5	2·026	24·312

Weight of Eggs—*continued.*

Pen No.	Name.	No. of Eggs.	Weight of Eggs.	Average Weight of Egg.	Average Weight per dozen.
			oz.	oz.	oz.
	Class 2.—Light Breeds.—Dry Mash.				
24	Vacant				
25	Mrs. T. Wilson	1,262	2,472·5	1·959	23·510
26	A. R. Boothman and Son	1,210	2,454·5	2·029	24·342
27	N. Burston	1,516	3,105·5	2·048	24·582
28	A. Enticknap	1,117	2,231	1·997	23·968
29	Braeside Poultry Farm	1,280	2,591	2·024	24·291
30	Claud Langley	1,356	2,774·5	2·046	24·553
31	Chas. Ridley	1,232	2,531	2·054	24·653
32	Ceres Stud	1,396	2,885	2·067	24·799
33	Vacant				
34	Norman Meyers	1,287	2,655	2·063	24·755
35	L. F. Bush	1,125	2,274·5	2·022	24·261
	Class 3.—Heavy Breeds.—Wet Mash.				
36	Vacant				
37	Marville Poultry Farm	1,294	2,660·5	2·056	24·672
38	Parisian Poultry Yards	834	1,769·5	2·122	25·460
39	Frank Harrison	1,219	2,434·5	1·997	23·965
40	W. Cullen	1,199	2,417	2·016	24·190
41	H. J. Hulme	1,287	2,566	1·994	23·925
42	J. Wear	1,419	2,820·5	1·988	23·852
43	J. C. G. Lyon	1,244	2,506	2·014	24·174
44	F. Telfer	1,090	2,177·5	1·998	23·972
45	Herbert Bros.	1,613	3,196·5	1·982	23·781
46	Vacant				
47	C. C. Dunn	1,398	2,838·5	2·030	24·365
48	Wanchai Poultry Farm	1,378	2,762	2·004	24·052
49	Wingood Poultry Yard	1,212	2,506·5	2·068	24·817
50	T. L. Eastaugh	1,236	2,488	2·013	24·155
51	D. Gibson	1,282	2,552·5	1·991	23·892
52	C. E. Graham	1,228	2,468·5	2·010	24·122
53	R. R. Christie	1,181	2,393·5	2·027	24·320
54	W. A. Shevill	880	1,777·5	2·020	24·239
	Class 4.—Heavy Breeds.—Dry Mash.				
55	W. A. Shevill	1,004	2,003	1·995	23·940
56	A. R. Boothman and Son	1,126	2,233	1·983	23·797
57	Vacant				
58	A. Clements	1,112	2,238·5	2·013	24·156
59	Marville Poultry Farm	956	1,909·5	1·997	23·969
60	A. Siede	1,011	2,016	1·994	23·929
61	C. C. Dunn	1,186	2,387·5	2·013	24·157
62	A. Siede and Sons	1,310	2,646·5	2·020	24·243

FINAL RESULTS

OF ALL BIRDS IN THE COMPETITION.

(Eggs laid outside of nest denoted thus (x); death of birds marked thus (*d*); birds returned during course of competition shown thus (*r*)).

Section A.—Groups of Six Birds Trapnested.

Pen No.	Competitor.	Hen. 1.	2.	3.	4.	5.	6.	(x).	Total to 31st March, 1924.
	Class 1.—Light Breeds, Wet Mash (White Leghorns).								
18	M. G. Leech ..	237	273	213	226	254	234	1	1,438
14	D. Gibson ..	216	194	280	(*d*) 219	255	256	2	1,422
16	Herbert Bros. ..	231	229	279	268	214	185	..	1,406
23	A. J. Hill ..	239	232	225	249	209	250	..	1,404
9	Brenda Clamp ..	256	251	201	250	177	196	1	1,332
2	W. Vercoe ..	218	305	182	205	(*d*) 191	227	1	1,329
19	H. Schmutter ..	259	248	216	216	212	176	1	1,328
1	H. Groves ..	244	245	226	214	191	207	..	1,327
7	"Oreps" Poultry Farm ..	232	245	181	169	278	196	6	1,307
11	G. Pocknall ..	207	249	187	223	188	213	2	1,269
5	Claud Langley ..	209	215	241	207	210	184	..	1,266
8	L. F. Bush ..	215	288	171	210	169	211	1	1,265
13	J. J. West ..	203	219	237	229	166	186	2	1,242
4	R. R. W. Brown	245	(*d*) 88	234	163	233	242	2	1,207
20	W. E. C. O'Neill ..	210	223	166	195	219	191	..	1,204
3	S. C. Handley ..	239	220	162	165	176	215	1	1,178
21	F. Wight ..	(*d*) 136	159	248	188	228	197	..	1,156
6	Mrs. T. Wilson ..	227	221	192	204	205	104	..	1,153
12	Wanchai Poultry Farm ..	261	251	(*d*) 142	183	(*d*) 81	211	..	1,129
15	Miss M. T. Kidd ..	179	238	180	204	180	128	2	1,111
22	F. Telfer ..	221	71	220	126	236	219	3	1,096
17	J. H. Chirnside ..	224	173	121	182	212	173	1	1,086
10	H. Williams ..	261	228	131	231	(*d*) 112	82	2	1,047
	Class 2.—Light Breeds, Dry Mash (White Leghorns).								
27	N. Burston ..	260	223	276	265	229	263	..	1,516
32	Ceres Stud ..	248	297	155	247	207	242	..	1,396
30	Claud Langley ..	232	225	241	223	204	229	2	1,356
34	Norman Meyers ..	218	281	182	238	188	180	..	1,287
29	Braeside Poultry Farm ..	228	264	201	224	200	161	2	1,280
25	Mrs. T. Wilson ..	235	183	163	201	223	254	3	1,262
31	Chas. Ridley ..	239	201	(*d*) 174	249	209	155	5	1,232
26	A. R. Boothman and Son ..	287	(*d*) 47	252	230	175	218	1	1,210
35	L. F. Bush ..	240	204	111	223	167	173	7	1,125
28	A. Enticknap ..	200	143	193	143	213	225	..	1,117

FINAL RESULTS—*continued.*

SECTION A.—GROUPS OF SIX BIRDS TRAPNESTED—*continued.*

Pen No.	Competitor.	Hen. 1.	2.	3.	4.	5.	6.	(x).	Total to 31st March, 1924.
Class 3.—Heavy Breeds, Wet Mash (Black Orpingtons).									
45	Herbert Bros. ..	265	323	208	288	284	245	..	1,613
42	J. Wear.. ..	235	239	222	227	246	248	2	1,419
47	C. C. Dunn ..	246	234	259	186	302	166	5	1,398
48	Wanchai Poultry Farm ..	244	273	203	185	213	260	..	1,378
37	Marville Poultry Farm ..	169	225	243	193	229	227	8	1,294
41	H. J. Hulme ..	233	251	227	188	203	(*d*) 185	1	1,287
51	D. Gibson ..	257	256	229	198	(*d*) 249	91	2	1,282
43	J. C. G. Lyon ..	180	203	172	254	250	185	..	1,244
50	T. L. Eastaugh ..	204	207	254	185	195	190	1	1,236
52	C. E. Graham ..	222	177	195	159	230	(*d*) 230	15	1,228
39	Frank Harrison ..	214	142	185	228	260	187	3	1,219
49	Wingood Poultry Yard	242	(*d*) 191	156	185	209	227	2	1,212
40	W. Cullen ..	201	248	165	100	265	220	..	1,199
53	R. R. Christie ..	238	94	236	230	174	198	11	1,181
44	F. Telfer ..	220	199	171	137	197	163	3	1,090
54	W. A. Shevill ..	190	172	61	36	212	192	17	880
38	Parisian Poultry Yards ..	226	182	60	84	(*d*) 132	142	8	834
Class 4.—Heavy Breeds, Dry Mash (Black Orpingtons, except Pen 62, Langshans).									
62	A. Siede and Sons	224	232	262	214	145	233	..	1,310
61	C. C. Dunn ..	202	152	161	237	251	180	3	1,186
56	A. R. Boothman and Son ..	188	160	108	258	228	181	3	1,126
58	A. Clements ..	232	154	214	156	171	180	5	1,112
60	A. Siede ..	146	191	174	202	151	146	1	1,011
55	W. A. Shevill ..	226	203	132	167	107	168	1	1,004
59	Marville Poultry Farm ..	120	194	186	87	128	235	6	956

Section B—Individual Birds.

Pen No.	Competitor.	Total to 31st March, 1924.	Pen No.	Competitor.	Total to 31st March, 1924.
Class 1.—Leghorns, Wet Mash (White Leghorns).					
219	G. McDonnell	304	129	Herbert Bros.	293
143	W. Pert	300	155	E. and D. O'Mullane ..	288
132	J. B. Nicoll	297	215	H. Miller	287

FINAL RESULTS—*continued.*

SECTION B.—INDIVIDUAL BIRDS—*continued.*

CLASS 1.—LEGHORNS, WET MASH (WHITE LEGHORNS)—*continued.*

Pen No.	Competitor.	Total to 31st March, 1924.	Pen No.	Competitor.	Total to 31st March, 1924.
170	W. Cullen	283	176	J. J. West	221
147	H. Groves	283	174	Britannia Poultry Farm	221
146	Rod. Jeffrey	281	159	Kelvin Poultry Farm	221
138	W. A. Adams	276	202	H. C. Clark	220
150	C. H. Middleton	274	194	D. J. Graham	220
191	C. A. Nylander	273	140	A. Siede and Sons	220
173	Britannia Poultry Farm	273	157	H. J. Bradshaw	218
144	W. Pert	273	134	H. W. Smith	218
232	H. P. S. Setford	272	216	H. Miller	216
169	W. Cullen	272	212	W. L. Caspar	216
152	C. B. Bertelsmeier	270	149	C. H. Middleton	213
135	L. F. Bush	265	204	Lady Ida	212
196	F. W. Gough	263	195	F. W. Gough	211
193	D. J. Graham	262	228	D. Adams	210
235	J. G. Alston	261	177	A. G. Stevens	210
156	E. and D. O'Mullane	258	137	W. A. Adams	200
224	S. N. Adams	257	188	J. McGregor	208
136	L. F. Bush	256	133	H. W. Smith	208
231	H. P. S. Setford	255	158	H. J. Bradshaw	205
148	H. Groves	255	229	A. A. Smith	204
218	P. J. Brenchley	253	165	Stranks Bros.	204
166	Stranks Bros.	252	162	F. W. Day	204
217	P. J. Brenchley	250	226	R. R. Christie	203
199	Mrs. J. J. Hooper	250	163	J. S. Buchan	203
183	Ceres Stud	(*d*)250	221	G. McCutcheon	200
130	Herbert Bros.	250	208	Claud Langley	199
203	Lady Ida	248	192	C. A. Nylander	199
186	L. G. Baxter	248	223	S. N. Adams	198
187	J. McGregor	246	151	C. B. Bertelsmeier	195
160	Kelvin Poultry Farm	245	236	J. G. Alston	193
230	A. A. Smith	243	172	F. Wight	193
197	G. G. Stud Farm	243	205	Woorayl Poultry Farm	191
131	J. B. Nicoll	243	185	L. G. Baxter	190
179	Stroud Poultry Farm	242	168	G. F. Walbran	190
180	Stroud Poultry Farm	241	211	W. L. Caspar	187
175	J. J. West	240	198	G. G. Stud Farm	187
167	G. F. Walbran	238	227	D. Adams	186
182	J. S. Mills	236	214	Mrs. N. Pearson	184
181	J. S. Mills	236	209	A. J. Hill	183
178	A. G. Stevens	234	153	T. L. Eastaugh	183
164	J. S. Buchan	231	184	Ceres Stud	161
145	Rod. Jeffrey	231	201	H. C. Clark	155
139	A. Siede and Sons	231	233	A. Minter	147
206	Woorayl Poultry Farm	228	225	R. R. Christie	142
200	Mrs. J. J. Hooper	226	234	A. Minter	(*d*)120
210	A. J. Hill	225	171	F. Wight	110
213	Mrs. N. Pearson	223	154	T. L. Eastaugh	(*r*)103
161	F. W. Day	222	220	G. McDonnell	(*d*) 87
207	Claud Langley	221	222	G. McCutcheon	(*d*) 57

FINAL RESULTS—*continued.*

SECTION B.—INDIVIDUAL BIRDS—*continued.*

Pen No.	Competitor.	Total to 31st March, 1924.	Pen No.	Competitor.	Total to 31st March, 1924.
Class 2.—Leghorns, Dry Mash (White Leghorns, except Pens 123, 124 (Brown Leghorns).)					
110	Jack Ryan	330	87	L. F. Bush	229
108	H. W. Smith	306	100	Britannia Poultry Farm	228
105	Norman Meyers	303	91	Claud Langley	227
115	Ceres Stud	286	98	Ela Mor	225
94	G. F. Walbran	286	97	Ela Mor	222
122	A. B. Leonard	281	126	C. L. Greenwood	221
118	Chas. Ridley	280	88	L. F. Bush	213
113	J. J. West	277	89	J. G. Alston	212
85	Herbert Bros.	270	116	Ceres Stud	210
109	Jack Ryan	265	111	F. Wight	204
95	J. Walker	262	123	F. W. Gough	203
104	E. and D. O'Mullane	261	92	Claud Langley	200
114	J. J. West	254	93	G. F. Walbran	195
127	Rod. Jeffrey	253	83	W. White	190
107	H. W. Smith	253	121	A. B. Leonard	181
117	Chas. Ridley	248	102	R. R. Christie	174
86	Herbert Bros.	247	96	J. Walker	169
112	F. Wight	245	128	Rod. Jeffrey	(*d*)165
101	R. R. Christie	243	125	C. L. Greenwood	148
103	E. and D. O'Mullane	237	124	F. W. Gough	144
106	Norman Meyers	234	120	G. McDonnell	(*r*)101
90	J. G. Alston	233	99	Britannia Poultry Farm	66
119	G. McDonell	231	84	W. White	37
Class 3.—All Light Breeds other than Leghorns, Wet Mash (Anconas, Pens 77, 78, 79, 80; Minorcas, 81, 82).					
82	H. Miller	260	78	Geo. Petterd	205
77	Geo. Petterd	245	80	R. Hardy	194
81	H. Miller	222	79	R. Hardy	191
Class 4.—Orpingtons, Any Colour, Wet Mash (Black Orpingtons).					
33	W. Cullen	338	40	Andrew Baker	215
75	T. L. Eastaugh	321	50	C. C. Dunn	214
76	T. L. Eastaugh	308	36	Roy Sanders	212
34	W. Cullen	283	31	H. G. Lawrance	211
61	W. L. Caspar	282	72	Mrs. R. H. Rooney	206
66	C. E. Graham	281	49	C. C. Dunn	198
62	W. L. Caspar	269	74	A. H. Cocks	197
65	C. E. Graham	(*d*)266	41	W. H. Rogers	195
27	Mrs. N. Pearson	266	68	A. Minter	194
39	Andrew Baker	265	51	All Well Poultry Farm	194
23	A. Siede and Sons	264	30	W. R. Verlander	190
69	F. W. Gough	260	42	W. H. Rogers	185
45	Marville Poultry Farm	260	52	All Well Poultry Farm	184
47	R. R. Cochran	252	29	W. R. Verlander	184
67	A. Minter	247	60	M. G. Leech	182
38	Woorayl Poultry Farm	244	48	R. R. Cochran	181
70	F. W. Gough	243	37	Woorayl Poultry Farm	179
58	R. R. Christie	241	73	A. H. Cocks	170
28	Mrs. N. Pearson	238	71	Mrs. R. H. Rooney	167
43	G. Dwyer	236	35	Roy Sanders	148
46	Marville Poultry Farm	232	25	A. J. Williams	(*r*) 94
64	A. G. Stevens	226	56	J. T. Cornish	(*d*) 83
59	M. G. Leech	226	44	G. Dwyer	72
63	A. G. Stevens	222	26	A. J. Williams	(*r*) 43
55	J. T. Cornish	221	57	R. R. Christie	43
32	H. G. Lawrance	221	24	A. Siede and Sons	(*d*)110

FINAL RESULTS—*continued.*

SECTION B.—INDIVIDUAL BIRDS—*continued.*

Class 5.—All Heavy Breeds other than Orpingtons, Wet Mash.

Pen No.	Competitor.	Breed.	Total.
8	L. Faulkner	Rhode Island Red ..	319
13	McCormack and Kinzel	„ „ „ ..	286
18	H. Miller	Rhode Island White ..	258
22	H. G. Lawrance	Rhode Island Red ..	257
2	A. Siede	Langshan	251
3	A. R. Boothman and Son	„	243
5	S. C. Handley	Rhode Island Red ..	241
20	W. Donovan	„ „ „ ..	238
17	H. Miller	Rhode Island White ..	228
21	H. G. Lawrence	Rhode Island Red ..	223
14	McCormack and Kinzel	„ „ „ ..	222
12	Black and White Farm	Langshan	221
6	S. C. Handley	Rhode Island Red ..	218
7	L. Faulkner	„ „ „ ..	209
10	Chas. Ridley	Langshan	206
19	W. Donovan	Rhode Island Red ..	197
9	Chas. Ridley	Langshan	197
16	P. J. Brenchley	Rhode Island Red ..	196
1	A. Siede	Langshan	192
15	P. J. Brenchley	Rhode Island Red ..	172
11	Black and White Farm	Langshan	139
4	A. R. Boothman and Son	„	(*d*) 79

THE ADVENT OF EGG-LAYING COMPETITIONS.

Whatever might be charged against egg-laying competitions, there is no question that they have been a great stimulus to specialized poultry-farming. To this factor we owe, in a great measure, the existence to-day of an industry worth nearly £3,000,000 per annum, which is sustaining at least 2,000 poultry-farmers and their families who have no other source of income. In addition, there are those who run poultry as a side-line, many of whom make a certain amount of income from the industry.

There are those who will opine that poultry is essentially a side-line proposition. This was the old idea, but what, it might be asked, was the progress made during that régime? Our figures will speak for themselves as regards volume, but there is another side to the question—was this side-line business really profitable? I am afraid that in most cases the glamour of income from hens was not properly balanced against the food consumed off the farm, and that in very many cases the income obtained from poultry was really obtained at a loss. At the present time no one need remain in ignorance of the cost of production as far as feeding is concerned.

Specialized poultry-farming, like the factory system in other industries, has come to stay, and poultry-farming under the new conditions must pay or the industry must die.

—*Agricultural Gazette of New South Wales*, May, 1924.

WARRACKNABEAL CROP AND FALLOW COMPETITIONS, 1923.

Report of Judge, L. U. Bartels, B.Ag.Sc., Science Field Officer.

Comments on the Competition.

The crops inspected included several very good ones and, inasmuch as they were grown on a range of soils, it was difficult to appraise their relative merit. Those grown in Wimmera soil and Mallee fringe land had an advantage over those on Mallee land, although the farmers on Mallee land were less handicapped by the heavy rain experienced about sowing time.

An analysis of the details of cropping indicates that June sowing is favoured, although several put their crop in in May. Eighty-two pounds of seed per acre, and 102 lb. of superphosphate were the average rates.

Federation wheat occupies by far the greatest area, and attention is paid to maintaining the purity of the seed. The crops, generally speaking, were clean and free from weeds, although hedge mustard (wrongly called Charlock) was common and Musk-weed (*myagrum perfoliatum*) was noticed in one or two crops.

The common diseases which infect wheat are known to most growers; yet among the exhibitors there were one or two who had not observed flag smut and loose smut. The former disease, which appears as black streaks on the leaves, is widespread and none of the crops was entirely free from it. In some years it becomes very bad and seriously reduces yields. When a crop is badly infected, a complete burn-off of the stubble should be made and care taken that pieces of roots and straw are turned in to rot. A rotation of crops is useful in suppressing the disease.

In loose smut infection, the head of wheat is replaced by a powdery mass of black spores—which are sooner or later blown off, leaving the backbone.

Usually only a small proportion of the plants are infected and it does not seriously diminish yields, but this year at least two crops were seen where the effect of loose smut was not negligible. This disease cannot be combated by the ordinary methods of pickling, as the fungus is carried inside the grain and if the disease becomes very noticeable, it is advisable to secure a change of seed.

Pickling to prevent ball smut is practised by all. Formalin is the fungicide commonly used. One or two farmers made inquiry about the new method of "Dry pickling." Some few years ago an officer of the New South Wales Department, Dr. Darnel Smith, discovered the efficacy of dusting powdered copper carbonate on wheat seed to combat ball smut. So far in Australia the method has not been adopted, but an index to its value is the fact that last year a large area in the United States of America was sown with wheat treated in this fashion. From

1 oz. to 2 oz. per bushel is dusted on the wheat seed, and this work may be performed weeks before seeding without detriment to the wheat or reduction in the efficacy of the fungicide. Unbroken smut balls are not removed, but the coating of carbonate on the grains prevents infection.

In Victoria powdered copper carbonate costs from 1s. 5d. to 1s. 10d. per lb.

Mr. O. B. Schulz's exhibit included several new cross-bred wheats of his own production, and he is to be commended for his enterprise. He is beginning to understand the magnitude of the work which he has undertaken, and to realize that it is attended by difficulties and many disappointments.

The production of new wheats is being carried on at our State Farms and Agricultural Colleges, and while these institutions can claim no monopoly of this or any other line of experiment, the work has become the function of the State, because, generally speaking, it involves a good deal of expense and the exercise of much patience and trained observation. Government officers have no axe to grind in delivering judgments.

The introduction of Federation wheat alone has recouped Australia many times over for any expenditure on agricultural investigational work. William Farrer set a high standard when he gave us this wheat, and its value is shown by the fact that at least 90 per cent. of the wheat grown at Warracknabeal and in the Wimmera is this popular variety.

The production of new wheats by cross-breeding is a relatively easy process: it is the selection of superior types from the progeny of a cross and the propagation of fixed strains which demands judgment and labour.

The fallows did not present as nice an appearance as they might have done. Summer fallowing is the general practice, but different cultural methods are followed, to some extent governed by the different soil types, e.g., in the freer working Mallee and Mallee fringe the spring-tooth cultivator has a vogue, but the efficiency of the Wimmera scarifier is well recognized.

The wisdom of leaving fallowed land in deep ridges after the cultivator is open to question. It is practised as a means of combating drift, but not all good farmers advocate it. It is suggested that the extra surface exposed, and the fact that in the rills there is very little mulch on the seed-bed, may reduce the efficiency of the mulch.

It is desirable, first, that a complete burn-off of stubble should be effected and, second, that unburnt stubble should be turned in to rot. This reduces the chance of disease being carried over from one season to another by spores.

Many fallows at Warracknabeal looked unattractive because of the stubble brought to the surface by too deep cultivation and dead weeds on the surface. Weeds should be kept down by sheeping or proper cultivation. Their presence not only means that moisture has been taken from the fallows, but some of them, like barley grass, are intermediate hosts for diseases such as take-all.

Details of Points Awarded.

Name of Competitor.	Apparent Yield.	Purity of Type.	Freedom from Disease.	Absence of Weeds.	Evenness.	Total.
Maximum Points	**35**	**20**	**15**	**15**	**15**	**100**
I. CROP—OPEN SECTION.						
Lehmann, P. S.	35	19	14	14	14	96
King, S. J.	33	19½	14	14	13½	94
Graetz, F. W.	33	18	13½	14	14	92½
Witney, W. W. (A) ..	31	18	14	14½	13	90½
Schulz, O. B.	31	18½	14	11	13½	88
Parsons, E. A.	38	19	13	14	13	87
McCooke, A.	26	19	14	14	13½	86½
Bungie Bros.	29	19	13½	11½	13½	86½
Kelly, D.	28	17	13	13	14	85
Witney, W. W. (B) ..	28	19	13	12	13	85
II. CROP ON FALLOW EXHIBITED IN 1922.						
King, R.	33	19½	14	14	15	95½
Pearce, T.	34	19	14	13½	12	92½
Bungie Bros.	33	18	14	13	14	92
Lamont, A.	28	19	13	12½	11½	84
McCooke, A.	24	19	14	14	13	84

AGGREGATE POINTS, FALLOW, 1922—CROP, 1923.

Competitor.	Fallow, 1922.	Crop, 1923. (Details above.)	Total.
Maximum Points	**100**	**100**	**200**
T. Pearce	96	92½	188½
R. King	92	95½	187½
Bunge Bros.	94	92	186
A. McCooke	93	(H. McLean) 84	177
A. Lamont (A)	89	84	173
J. H. Cove	94	..	..
G. Clyne	93	..	..
J. McLean	92	..	..
Vaughan Bros.	92	..	..
G. Morcom	91	..	..
Parkinson Bros.	91	..	..
T. Brown	90	..	..
A. H. Hewitt	89	..	..
W. W. Witney	87	..	..
Lamont Bros.	87	..	..
G. Coutts	85	..	..

III. FALLOW.

Name of Competitor.	Moisture.	Mulch.	Absence of Weeds.	Evenness of Cultivation.	Total.
Maximum Points	**25**	**25**	**25**	**25**	**100**
Parsons, G.	24	22	23½	23	92½
Marshman, D. A. (B)	23½	22	24	22½	92
King, S. J.	22	23	23½	23	91½
Lehmann, P. S.	22½	23	24	22	91½
Forster, F. M.	23	21½	24	22½	91
Bungie Bros.	21½	22½	24	22½	90½
Marshman, D. A.	23	22	24½	21	90½
Gove, J. H.	23	20	24½	20	87½

Crop Section.

Mr. P. G. Lehmann's winning crop of Federation was a very fine exhibit. The land on which it was grown was Mallee fringe, and portion had been summer-fallowed and portion winter-fallowed. The crop was of uniform excellence, fairly tall, regular, and pure. A few plants of wild oats were scattered throughout, but there was very little undergrowth. Flag smut was observed, but no ball smut. Mr. Lehmann's success was not achieved by chance; he is a keen observer, and a student of method. The major portion of the area sown in wheat had been disc-ploughed in March and left till July, when it was scarified. It was scarified in September, and portion scarified again in November. The depth of scarifying was 2½ inches. The land was harrowed dry in March, and spring-tooth cultivated in May to a depth of 2½ inches. At the end of June and beginning of July it was sown with the spring-tooth combine. The heavy harrows followed. The rate of seeding was 84 lbs., the rate of manuring 170 lbs. per acre. The wheat, obtained from the Research Farm at Werribee, was pickled in formalin with a Hannaford pickler. There is no doubt that the heavy manuring played an important part in the development of this fine crop. Mr. Lehmann maintains that its influence is apparent from the start, as it induces rapid and regular germination.

Mr. R. King showed a remarkably uniform crop of Federation. It contained an odd patch of wild oats, but otherwise was very clean. The wheat was of a high standard of purity, was well headed, and had been carefully drilled. A little flag smut was apparent. The land was fringe Mallee. In 1921 it bore a crop of oats, and was summer-fallowed in 1922, having been scarified 3 inches deep at the end of March. In June and July it was again scarified about 2½ inches deep. After the first rain in May it was spring-tooth cultivated, and again in June to a depth of 2 inches. It was sown at the beginning of July with the spring-tooth combine, and harrowed after drilling. Ninety pounds of wheat and 100 lbs. of superphosphate were put in per acre. The wheat was formalin pickled.

Mr. S. J. King presented for judging an excellent crop of Federation. It was almost entirely free from wild oats, but contained a little Wimmera rye grass. The wheat was clean-strawed and well headed. Practically no disease was apparent, although a little flag smut showed. An odd miss in drilling was observed. The crop was grown on land

which was heavy Mallee for the most part. In March, 1922, it was scarified to a depth of 1½ inches; it was again scarified in July, in August, in September, and in October, and portion was worked over after rain in January. In March it was harrowed dry, and at the end of May it was spring-tooth cultivated twice. It was sown at the end of June with the spring-tooth combine and harrowed afterwards. The rate of seeding was 75 lbs. per acre, and the rate of manuring 90 lbs. The seed (obtained from the winner of the Brunton Cup at Rupanyup) was pickled in formalin.

Mr. T. Pearce's exhibit was half of an area of 200 acres of Federation, which made a splendid show. It was grown on summer-fallowed black Wimmera soil. In 1921, the land was in wheat, and in March, 1922, after the stubble was burnt, the paddock was scarified from 2½ to 3 inches deep. In August it was again scarified, and immediately afterwards crossed with the scarifier; in October scarified again 3 inches deep; in November lightly spring-toothed and harrowed, and in December harrowed. In May it was cultivated rather deeply with the spring-toothed cultivator fitted with narrow tines. The wheat, pickled with formalin, was sown at the rate of 80 lbs. per acre. Portion of the land was manured with 112 lbs. of 22 per cent. superphosphate and portion with 120 lbs. of 18 per cent. superphosphate. Immediately after sowing the land was harrowed. The crop was ripening somewhat unevenly in places, and the extended period of sowing was against uniformity. A few misses in drilling were noticed. Only very few wild oats showed up, and very little undergrowth was seen. The wheat was relatively pure, and, beyond a trace of flag smut, there was no disease.

Mr. Graetz's exhibit of Federation was in two sections, and both portions were very good. The land was heavy Mallee, summer-fallowed in 1922. It was scarified three times, and in May, 1923, was spring-tooth cultivated and sown. Eighty pounds of seed with 80 lbs. of superphosphate were sown on one portion, and on the other 90 lbs. of seed and 90 lbs. of manure. In one section wild oats showed up, but for the most part the crop was clean and free from disease. The wheat contained some barley and a few foreign heads.

Messrs. Bunge Brothers made two exhibits, both very meritorious, but one of them, an area of Federation, deserves more than passing mention. It was grown on summer-fallowed land, ploughed from 4 inches to 5 inches deep in April, 1922, harrowed in June, scarified in July and harrowed, scarified again in August-September, and lightly scarified in October. A stroke of the harrows was given in summer, and the area was sown during the third week in June. Ninety pounds of formalin-pickled seed and 100 lbs. of 22 per cent. superphosphate per acre were used.

An excellent, fairly regular crop resulted, but it contained a few foreign ears. Except for an odd patch of wild oats, it was clean looking. There was some undergrowth.

Fallow Section.

The fallow awarded highest marks was shown by Mr. F. Parsons. It had a fair mulch overlying a level seed-bed well charged with moisture. The surface was a little lumpy in places, and a few weeds, including barley grass, ironweed, and hedge mustard, showed on the ground.

The land was Buloke country, and for three years the scarifier has been used for breaking it, but Mr. Parsons purposes ploughing next year. Ordinarily the scarifier is preferred, because it performs the required work better in autumn. In April the field exhibited was scarified 4 inches deep. In July the eastern half was scarified, and in August the other half to a depth of 3 inches; the whole area was harrowed in August. In September it was scarified to about 3 inches, harrowed at the end of September, and again harrowed in December.

Mr. Parsons favours summer fallowing, and from 2½ to 3 inches he considers the right depth for cultivation. The scarifier combats weed growth well, but the land may require more working, which is beneficial to the fallow if done at the right time.

Mr. D. A. Marshman entered an area of summer-fallowed land, which was superior to an exhibit of winter-fallowed land in an adjoining paddock. This summer fallow was adjudged the second best in the competition. It had a mulch of nice depth, a little lumpy in parts, but it overlay a seed-bed well charged with moisture, and fairly level and compacted, although there was slight evidence of cracking and hoof marks and wheel marks detracted from its appearance.

In 1921 the land was in wheat, and during 1922 in pasture. In March, 1923, it was dry-ploughed with the mouldboard plough to a depth of 3 inches. At the end of July it was cultivated with a Wimmera scarifier; at the end of August scarified to a depth of 2½ inches, and again at the end of September, when light harrows were attached to the scarifier.

Mr. S. J. King showed a fairly good area of fallow. The mulch was in ridges and the seed-bed somewhat ridged. A few plants of barley grass showed up throughout. The moisture conservation was fair. The land was heavy black Mallee and in 1922 it was in wheat; the stubble was burnt in March and the paddock then scarified with the S. J. scarifier to a depth of 2 inches. It was again scarified in late July. At the end of August it was cultivated with the S. T. cultivator fitted with broad tines. At the end of September it was again scarified 2 inches deep and left.

Mr. King did not cultivate to a greater depth than 2 inches and considers that sufficient. The paddock has not been ploughed, except with a skim plough, for six years. Mr. King is doubtful of the value of summer fallow.

Mr. Lehmann's fallow was moderately good. Portion had been left ridged and a good deal of dry weeds, &c., lay on the surface. A few weeds were growing. Portion of the fallow had been harrowed, but it was not very regular. The mulch was on the deep side. The seed-bed was fairly level and well charged with moisture.

The field was disc-ploughed in March and April to a depth of 3 inches; in August and September it was scarified again 3 inches deep. A second scarifying 2½ inches deep was given in October, and in November portion was scarified and a portion spring-tooth cultivated. Mr. Lehmann believes in ploughing for the first working. Scarified soils are considered to crack worse, and Mr. Lehmann, from his past experience, is firmly convinced of the ill effects of an uncompacted seed-bed.

Mr. Lehmann has made the interesting observation that heavy rains at seeding time, such as occurred last year, are absorbed more quickly

by summer-fallowed land than by winter-fallowed land. I have not heard this from any one else, but it is feasible that the deeper penetration of moisture—caught in the prolonged fallow—facilitates the passage of moisture through the soil. The moisture in the soil exists usually as a film surrounding the particles, and when the film is of a medium thickness, water moves through the soil more rapidly than when only a thin film adheres.

GOROKE FALLOW COMPETITION, 1924.

Report of Judge, R. S. McTaggart, Field Officer.

This competition consisted of—

(*a*) Best 50 acres of fallow on light soil.
(*b*) Best 50 acres of fallow on heavy soil.

Six entries were received in section (*a*), while four entered for section (*b*).

Undoubtedly farmers in the Goroke district are faced with many difficult problems, chief amongst which is the varying types of soil, each requiring different methods of treatment. Early rains which fell during February and March made cultivating in light sandy country easy. It was found that heavy soils require more working than light soils, and this report will deal chiefly with that aspect.

A common difficulty was the cultivation of crab-holey country. I would suggest the use of a stump-jump scarifier in place of disc implements, particularly if the scarifier be fitted with shears which have serrated edges. It would, I think, do better work than the disc, as it has a greater range in movement and would deal effectively with thistles and other rubbish. This is a new type of shear, which has a "nick" on each side, and somewhat resembles a saw. The advantage of such a shear over a plain edge when cultivating a paddock where thistles are plentiful is that it cuts the plant and does not let it slip round the foot, a common fault with a smooth edged type of shear. Another point in its favour is the swinging action of the tines, which allows the machine to follow an uneven surface. It would assist greatly in levelling down the banks, as there is always a certain amount of soil removed from the top and deposited at lower levels during the process of cultivating.

Section A.—Light Soils.

As rain fell a few days previous to judging, 18 points were allotted to each fallow for moisture.

Name.	Moisture.	Mulch.	Cultivation.	Absence of Weeds.	Total.
Possible Points	**25**	**25**	**25**	**25**	**100**
A. Richards	18	22	20	19	79
G. McPhee	18	19	20	20	77
B. Ross	18	20	22	16	76
J. Cameron	18	16	19	17	70
E. Ward	18	16	18	17	69
F. Hinch	18	12	15	18	63

The first prize in this section was awarded to Mr. A. Richards. His land was ploughed in August to a depth of 4 inches. The soil was of a sandy nature, and received three cultivations with a spring-tooth implement, two during December and one in April. This paddock was stocked with sheep during November; when weeds for the time being were checked the flock was removed. They were put in again a few days previous to cultivating in April.

Mr. McPhee.—The surface on this field was crusty and inclined to set in places, although it gained second place with 77 points. There was a complete absence of weeds at the time of judging. It lost points for mulch and cultivation. It was ploughed to a depth of 4½ inches in June and July, and spring-toothed during September and again in March.

Mr. B. Ross.—This field faces the Minimay-road, and is of a light soil showing practically no variation. It was ploughed during September and October, cultivated with the spring-tooth during November, and again in February. Points were mainly deducted for weeds. Had this matter received attention, Mr. Ross's fallow would have been easily the leading one in the section.

The remaining three fallows would have benefited by another cultivation; the cloddy nature of the surface was too rough.

Section B.—Heavy Soils.

In this section, owing to the rain just prior to judging, 20 points were allotted to each fallow for moisture.

Name.	Moisture.	Mulch.	Cultivation.	Absence of Weeds.	Total.
Possible Points	**25**	**25**	**25**	**25**	**100**
C. D. Block	20	22	22	23	87
J. Molloy	20	22	22	22	86
P. Molloy	20	20	20	18	78
F. O. Robertson	20	19	20	18	77

Mr. Block gained first prize in this section with a total of 87 points. The field entered was black land and worked to a fine tilth. Indeed, it was equal to any fallows on the Horsham Plains. Ploughing took place during October to a depth of 3 inches; afterwards the paddock was harrowed, and scarified the last week in October. In the second week of November it was spring-toothed. Sheep were then used to check the growth of weeds during the following months. In February it was again harrowed.

Mr. J. Molloy's fallow was good. The soil here showed variation, and one point was deducted for weeds. It was ploughed in September to a depth of 3½ inches, a five-furrow skeleton mould board plough being used, and it was scarified in October. Sheep were used to check any growth of weeds. In February the paddock was harrowed. The knife-bar could be usefully employed to cut weeds on this class of soil.

Mr. P. Molloy's land was too wet for seeding in 1922. It was re-ploughed and harrowed in November, 1923. During December it

was disced and harrowed. Points were deducted for thistles, which may prove troublesome during seeding operations. This type of land would prove ideal for the type of scarifier already described.

The area submitted by Mr. F. O. Robertson consisted of black soil. It was ploughed to a depth of 4 inches in August, spring-toothed in September, and following this cultivation sheep were used to check the growth of weeds up till the first week in March. During March it was disced. The last operation left a mulch which was not even, and points were deducted. Again, points were lost for weeds. The scarifier should do good work in crab-holey country, particularly in this field.

Thanks are due to the secretary for the care taken in organizing the competition, also for his help in connexion with experimental work which is conducted in this district.

NUMURKAH CROP AND FALLOW COMPETITION, 1924

Report of the Judge, H. A. Mullett, B.Ag.Sc., Senior Inspector of Agriculture.

Than Numurkah, it would be difficult to find another part of the State where more extensive areas of first class wheat soils exist, or where the climate is more suitable for wheat. Within a radius of 20 miles quite a range of soils are met with, some better than others, but all of them good.

To the south, towards Tallygaroopna and Shepparton, are fairly extensive areas of grey silty loams, which have a good clay subsoil But the predominant colour of the balance of the land, that is the greater part, is red. There are many types of red soil, ranging from deep sandy loams, as at Bunbartha, silty loams, as at Invergordon and Katunga, and clay loams, as at Waaia and Baulkamaugh.

Naturally enough, it has been a comparatively simple matter to grow crops averaging between six and seven bags to the acre. With yields such as these Numurkah farmers have been content for many years past, but recently the feeling has been growing locally that the best use is not being made of the land. With this, every one who makes a critical survey of the district and its natural advantages must naturally agree.

In reaching their present frame of mind, the members of the Numurkah Agricultural Society have already gone a long way along the road to raising their yields, for better wheat-growing methods are not often discovered and put into practice unless the rural community co-operates in the work, and the experience generally is that it is easier to make the discoveries than to get the community to believe that they are worth while searching for.

In the Society's endeavour to improve the wheat yields, the method of attack used so successfully in the Wimmera has been adopted. That is, a crop and fallow competition has been commenced for the purpose

of giving publicity to the various methods of wheat-growing adopted in the district, and to the resultant yields.

At a later stage a series of experimental plots may be installed to elucidate problems as they arise.

The Competition, 1924.

The competition takes the form of a prize for the highest aggregate for 50 acres of fallowed land, and for the wheat crop grown on this fallow—both judged on points.

It was intended to judge the fallow in December, but the work was unavoidably delayed until the following March. In the meantime a good deal of summer rain aad fallen in the district. The heavy rain set the fallows down time after time, but the extra work involved did not deter the greater proportion of the competitors from re-working the land as often as was required; indeed, in some cases, perhaps, it was worked more often than was necessary or desirable. At all events the wet weather served to demonstrate the keenness with which the members of the Society are tackling their self-imposed task, though it must be said that a more unsuitable season for a comparative test of fallows could hardly have eventuated. One point of difference which usually distinguishes an unsatisfactory fallow from a good one is in the moisture content of the subsoil. Normally this is dependent on the earliness with which the fallowing has been done, and upon the skill with which the dust mulch has been placed on the fallow and maintained there. The comparison was rendered unsatisfactory because in some parts of the district, where the rains had been very heavy, all the fallows were practically saturated, irrespective of the cultivation methods used. Therefore, to test the moisture content, recourse was made to a soil auger, with which samples for analysis were taken to a depth of two feet.

In examining the fallows by this means, and with a shovel, many interesting facts were noted. One was the absence of a good clay subsoil in some of the lighter soils of the district. Laboratory analysis of the samples subsequently indicated that these were usually the lowest in water content. This would appear to indicate the necessity for extra careful moisture conservation by early fallowing, preferably summer fallowing, and for thorough mulching. Incidentally, of course, the suitability of the soils for lucerne growing, under the projected irrigation scheme, was brought out.

Another point is the marked tendency of the light silty soils to crust over after rain. This implies loss of moisture if the fallow is allowed to remain crusted, and, on the other hand, germination troubles if the soil is worked too fine. Here then, the methods of working the fallow must be a compromise between moisture conservation and good germination. On these soils, where possible, the use of the disc cultivator should be avoided, because it throws the fine soil on top. The disc may be largely replaced with the Wimmera scarifier for heavy work, and the rigid-tined cultivator for somewhat lighter work.

A common fault with many of the fallows was that they had been worked too deeply with disc cultivators in the spring, and were loose practically to the depth of the ploughing, despite the heavy rain, this suggests that the disc cultivator should be used more sparingly and with much greater care. That good work can be done with it, however, is shown in the fallow exhibited by Mr. J. A. Cowan. The mulch, though rather fine, was of regular depth, not more than 2½ inches, and the bottom was wonderfully level. Twenty-inch discs were used.

But the lack of consolidation in the fallows, though serious enough, is probably not the only direction in which an improvement of method should be effected. Judging by Wimmera standards, and having regard to the germination troubles, the average weight of seed and manure applied in the district, about 60 lbs. per acre of each, appears to be too low. Almost certainly it will pay to increase the seed to 70 lbs. per acre for May sowing, with further increases as the season advances. What has deterred farmers putting on more superphosphate is the belief that it would increase the height of crops, which already have a marked tendency to run to straw. But, on the contrary, the rankness of the crops generally indicates an abundance of nitrogenous plant food in the soil, which requires balancing up with phosphates. Certainly superphosphate increases the vigour of the young crop, but the extra growth at this time is compensated for by the earlier maturing of the crop and its ability to set better grain. In any case, the question as to how much manure should be applied per acre is one that is peculiarly easy of solution by an appeal to a simple series of comparative field experiments.

The question of whether the crops are not being ravaged by insidious diseases like flag smut, and take-all, must be left until an investigation can be made during next harvest time.

Results.

Mr. J. A. Tweddle, of Waaia, was awarded 96 points, and first place. Mr. D. Rendell was second with 94, and Mr. J. A. Cowan third, with 93. Then follow Mr. S. G. Poole, Messrs. Hodge Brothers, No. 2, and Mr. W. C. Tyack, with 92 points each.

The winning fallow was notable for a very effective mulch of loose mellow soil, not too finely divided; it was of regular depth (about two inches) throughout the entire paddock. It rested on a well consolidated "bottom" whose level character was indicative of thorough and regular cultivation. There was a complete absence of weeds, and the moisture content was satisfactory, though a few other fallows were somewhat more moist.

The paddock has been sown to wheat, then oats, and was out in grass last year. In June it was ploughed to between 4½ to 5 inches deep and harrowed immediately afterwards. During the second week in September it was spring-toothed, also again during the corresponding week in November. Early in December a stroke of the harrows was given. Early in January a further spring toothing was given, and repeated early in March. It will be noted that the land was

harrowed immediately after ploughing, and this probably had an important bearing on the relative ease with which it was kept in good condition.

Almost equally good was Mr. D. Rendell's exhibit. The paddock was sown to oats last year. The soil was somewhat loose, and in the autumn a heavy set of weighted harrows was put over the paddock. In June and July it was ploughed, then harrowed twice in August. In September a stroke with a spring-tooth cultivator was given, followed by harrowings in October, and again in early December. Later in the same month another spring-toothing was given, then a harrowing; finally, after rain, another cultivation with the spring-tooth. This fallow, like that of the winner, was particularly good in respect to mulch and the consolidation of the under layers.

Examining a Fallow.

Mr. J. A. Cowan's paddock of red clay loam also showed very good consolidation below, but a point or two was deducted because the mulch was rather too finely divided, and of somewhat uneven character.

The interest in this fallow lies in the fact that although it was disced twice, it showed a good level bottom below the mulch, which was of a satisfactory depth. It was quite the best piece of discing that has come under notice for some time. New 20-inch discs were used, and the implement was evidently well adjusted and driven with more than average skill.

The paddock was in wheat last year. A portion was scarified up in June with an old type scarifier, and the remainder ploughed in July. In August the scarified part was re-scarified and the balance harrowed. In September part was rolled. In October a light disc cultivation was given. At the end of November the land was harrowed. In March another light discing was given. Mr. S. C. Poole's fallow, on the grey soil at Mundoona, showed excellent moisture content; the mulch—rather

shallow and thin in places—was nicely clodded. In June and July the paddock was ploughed to four inches deep and harrowed quickly afterwards. At the end of September it was scarified with a scarifier of the broad-footed type, then spike-rolled. In mid-October a disc cultivator was used, and in early November a land grader. Between December and early March four strikes with the scarifier were used, and sheep were given access to the paddock.

Messrs. Hodge Brothers' No. 2 entry at Invergordon was summer-fallowed. Analysis showed it to contain the highest moisture content of any fallow exhibited, and one considerably higher than their No. 1 entry of winter fallow.

In February the paddock was disced up; it was ploughed to four inches deep with a mouldboard plough in August, and given two harrowings immediately after the plough. In early October a disc cultivation was given, and in November a harrowing. In January the land was worked up after rain with a rigid-tined cultivator, in February, harrowed, and in March cultivated with a rigid-tined implement. The mulch was of uneven depth, but of mellow texture. Beneath the mulch, examination showed evidence of irregular consolidation.

Most of the other fallows had been equally carefully prepared, and there were hardly any that were not worthy of commendation.

In conclusion I desire to thank those members of the Society whose consideration helped to make the judging trip pleasant and instructive, and especially Mr. William Hooper, of Mundoona, the genial President of the Society.

Details of Awards.

SECTION 1.—HIGHEST AGGREGATE FOR 50 ACRES OF FALLOWED LAND, 1924, AND FOR THE CROP GROWN ON THE FALLOW, 1925.

Fallow (50 Acres).

Competitor.	Soil Type.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Maximum Points ..	.. .. ..	**25**	**25**	**25**	**25**	**100**
J. A. Tweddle ..	Red loam ..	22	25	25	24	96
D. Rendell ..	Red loam ..	21	24	25	24	94
J. A. Cowan ..	Red clay loam	22	22	25	24	93
S. G. Poole ..	Grey silt ..	23	22	25	22	92
Hodge Bros. (No. 2)	Red silty loam	25	23	22	21	92
W. C. Tyack ..	Red clay loam	23	21	25	23	92
D. Cowan	Red clay loam	21	23	25	22	91
C. Gainey ..	Grey silt ..	21	23	24	22	90
W. & T. Burgess ..	Red sandy loam	17	24	25	24	90
Hansen Bros. ..	Red loam ..	20	24	24	22	90
W. J. Thornton ..	Red clay loam	22	22	24	22	90
P. Tweddle ..	Red sandy loam	17	22	24	24	87
Hodge Bros. (No. 1)	Red silty loam	18	23	24	22	87
R. Adam	Red silty loam	20	21	24	20	85
Thos. McGrane, jr. ..	Red clay loam	20	23	24	18	85
J. Christie ..	Sandy loam ..	17	21	24	22	84
G. A. Bedwell ..	Red clay loam	22	18	22	21	83
F. Pratten ..	Red loam ..	20	20	23	20	83
G. H. Close ..	Grey silty loam	18	19	21	20	78

POTATO PRODUCTION UNDER IRRIGATION.

By J. T. Ramsay, Potato Expert.

With the development of irrigation within the State there has been a gradual increase in the variety of crops treated by this method. Irrigationists in increasing numbers have for some years past been devoting attention to the production of potatoes, and many have obtained very successful results. On account of the amount of labour involved in the work of irrigating and cultivation, the growth of large individual areas is not advisable, as this entails the retention of a large staff of men and horses to cope with the work which recurs at rush periods during the growing season. These rush periods are sandwiched between times of comparative idleness, which, of course, materially increases the cost of production.

Water Supply Channel—Werribee.

In outlining the method of procedure to grow a crop of potatoes by artificial irrigation, it is impossible to lay down a hard-and-fast rule which would procure the maximum crop in every season and every variation of soil. For instance, it might be necessary in some seasons, owing to the dryness of the soil at the date of planting, to irrigate prior to planting, while, on the other hand, the soil might contain sufficient moisture from natural rainfall to obviate the application of water from the channels. Again, some soils have greater power of retention of water than others, and, therefore, require less water to be supplied to the land to produce the same result. Then, again, the climatic variation of the seasons might necessitate four or five irrigations (as in a dry year) or none (as in an abnormally wet year). These illustrations

will be sufficient to prove that no rule-of-thumb method can be advised. In the following outline of advice to growers, it will be taken for granted that the crop has to be produced *in toto* by artificially-applied water. The first and foremost fact that the irrigationist should grasp is that the potato is a moisture-loving crop. The nearest practical description that can be given of the ideal condition of the soil from the time of planting the crop to the time when it is just past the full bloom, is that the soil should be kept as near as possible in a moist condition without being excessively wet.

Certainly, at times of irrigation excessive wetness must obtain, but if intelligence is used by the grower, that, combined with the immensely rapid evaporation common to all districts where irrigation is practised, will reduce the actual time of excessive wetness to an unharmful period.

Irrigating Potatoes.

TIME OF PLANTING.

The date of planting should be as early as possible, but, of course, this will vary with the different districts. On the Werribee settlement, planting in the average season can with safety be commenced at the end of July, but in the northern parts of the State the average date for safe planting is as late as from the beginning of September.

The factor governing the date of planting is spring frosts. The later these are liable to occur, the later planting must be delayed. Supposing, in the average year, spring frosts in a district are not likely to occur later than the beginning of September, then planting may be done with comparative safety in the middle of August, as the plants would not be through the ground in time to suffer damage. Broadly speaking,

planting may take place with safety from two to three weeks prior to the incidence of late spring frosts. Thus growers must be guided as to the date of planting by the spring frost records of their districts. Crops may be protected from frosts by means of smudge fires, but it is advisable to seek safety in later planting, and so save this extra work, which not only means time and money, but depends for its effectiveness on the thoroughness with which the treatment is given and the absolute accuracy of the time of its application.

PREPARATION OF GROUND AND PLANTING.

Presuming, as already stated, that dry ground has to be treated, it will be necessary to have the levels of the land taken, and grading done so as to eliminate the lumps and hollows, thereby giving an even fall to facilitate the application of water.

The description of grading methods will not be dealt with here, as it has already been exhaustively explained in other bulletins, and is well understood now by all with any experience of irrigation.

The land intended to be planted should first be irrigated. As soon as it can be worked after irrigation it should be well and deeply cultivated both ways, either with the spring tooth or disc cultivator. Immediately afterwards it should be harrowed, following which ploughing and planting should proceed with expedition. The quickest and most convenient plough to use is the three-furrow mouldboard, followed by manure sower and planters (hand labour). An attachment can now be obtained for three-furrow ploughs which drop the manure mechanically and permit the driver of the plough to sow the sets by dropping them through a funnel into the row in front of one of the furrows, where they are immediately covered, but the expense of this machine is hardly justified for a small acreage.

Failing possession of a three-furrow plough, a double-furrow and a single may be used together, or planting may be done with the single-furrow alone. Whichever plough is used, the furrows should be set to cut a width of 9 inches, and planting should take place in every third furrow, i.e., the rows should be about 27 inches apart. The sets should be planted at a depth of not less than 5 inches, and from 14 to 15 inches between the plants in the row.

Care should be taken to harrow each day's planting on the day of planting; in fact, it cannot be harrowed too soon after planting takes place. The object of this is, of course, to conserve moisture.

VARIETIES—WEIGHT OF SEED PER ACRE AND CLASS OF SEED.

Early varieties only are recommended, as, on account of their shorter period of maturation as compared with late sorts, the margin for error in their cultivation is lessened, with beneficial results to the grower. The weight of seed per acre recommended is not less than 12 cwt., and up to 16 cwt. per acre can be sown with advantage. The best class of seed is that which has been selected immature, and which is sprouted. As this phase of potato culture has been exhaustively dealt with in previous articles, it is not necessary to cover that ground in detail again.

MANURING.

The augmentation of the natural fertility by means of artificial fertilizer is not only productive of heavier yields, but has also a most beneficial influence on the soil for successive crops.

Probably the compound manure known as market garden manure gives the best returns. This should be applied in the furrow with the seed at the rate of not less than 5 cwt. per acre. The results of manure trials under irrigation at Werribee in the seasons 1922-23 are given

General View of Potatoes Growing under Irrigation.

hereunder as an illustration of the effect of various manures at varying rates on the crop:—

Plot.	Fertilizer per Acre.	Yield.		Increase.		
		tons.	cwt.	tons.	cwt.	
1	No Manure	3	7	—	—	—
2	5 cwt. Super.	4	10	—	13	19%
3	10 cwt. Super.	6	9	3	2	92%
4	5 cwt. Super., 1 cwt. Ammonia Sulphate	5	4	1	17	55%
5	10 cwt. Super., 2 cwt. Ammonia Sulphate	6	9	3	2	92%
6	10 cwt. Basic Super.	6	0	2	13	79%
7	5 cwt. Market Garden	4	6	—	19	28%

It will be noted that the heaviest yield was obtained from the use of 10 cwt. superphosphate. But it should also be noted that 5 cwt. of market garden gave a heavier return than 5 cwt. of superphosphate,

and it is permissible to infer that had 10 cwt. of market garden manure been tested on one of the plots, that dressing would have eclipsed the yield from 10 cwt. superphosphate.

Cultivation during the Growing Season.

This occupies the place of greatest importance of all operations connected with the growth of potatoes under irrigation. Unless the cultivation during this time is thorough, the quality of seed and the application of manure and water go for nought. Herein lies the reason why a grower should not attempt to grow an acreage which will in any way strain his physical farm-working strength of horses and men.

After the planting and harrowing operations described previously are done, harrowing should be given frequently to maintain the land in a nice tilth. The grower must determine the necessary frequency of

Digging Potatoes by Machine

this operation under his own local conditions, but on no account must it be infrequent enough to allow the slightest surface setting of the soil to take place.

Harrowing may be continued with cheapness of cultivation and benefit to the plants until they are 5 or 6 inches high. After they have reached this stage, recourse must be made to inter-cultivation in the rows by the use of a one, two, or three row horse-hoe. The usual practice is to use a one-row horse-hoe, and this implement is sufficient for small areas, as it is capable of getting over from 3 to 4 acres per day. In the early stages of growth, when the plants are small, this implement should be set to cultivate deep and wide—i.e., close up to the plants in the rows. Each subsequent inter-tillage should be given with a progressively decreasing depth and width, so that the growing plants may not be injured. It will be found of benefit to use the horse-hoe frequently between irrigations, and also as soon after irrigations as the ground will

permit working. Too much stress can hardly be placed on the importance of efficient and frequent horse-hoeing, the benefits gained being—(*a*) conservation of moisture, (*b*) aeration of the soil, (*c*) stimulation of bacterial activity, and (*d*) tilth in which the roots of the plants can develop with the minimum of restriction.

LENGTH OF LANDS FOR IRRIGATION.

In practice, from 5 to 8 chains is the most effective length for water to run. The lighter the soil, the shorter should be the lands.

IRRIGATION.

Still presuming the season to be quite dry, under average conditions it will be found necessary to irrigate about one month from the date of planting. At that time the plants from sprouted seed should be showing well up in the rows and their foliage commencing to spread.

Prior to irrigating, the horse-hoe with the hilling attachment adjusted should be run through the rows, and the soil on either side thrown upon the drills, but not sufficiently high to cover the plants. This facilitates tremendously the application of water. Care should be taken not to commence irrigating until there is a good "head" of water on hand, as without this the irrigator has but poor control over the regulation of the supply.

The water should never be allowed to flow over the tops of the rows, but should be confined in its flow to between the drills.

The flatter the land being irrigated, the greater the flow of water it can take within a given time. The greater the fall, the less the flow that can be taken in the same time.

Clay loams should be irrigated at a slower rate than light sandy soils, on account of their being less permeable.

From these remarks the reader will see the necessity for close observation by each grower of his own particular soil environment. It is only by doing this that he will be able to determine the method likely to produce the best result.

In a season without rain, subsequent irrigations will be required at intervals of about three weeks. The final irrigation should be given not later than when the plants are just going off the bloom. Cultivation and hilling up should then be given and the crop allowed to mature.

It is of VITAL importance that cultivation after each irrigation be given as soon as the ground is fit to work, and that the area be then hoed as quickly as possible.

Excessive application of water will (*a*) produce tubers of very low table quality, (*b*) induce rotting the field, and (*c*) prevent adequate cultivation.

Irregular or insufficient application of water will cause (*a*) a very poor yield, and (*b*) large percentage of second growth.

The water requirement of the potato crop is continuity of moisture without excessive wetness. Given that, the irrigation districts can produce, because of their arid atmospheres and high potash soil content, potatoes of the very finest table quality.

STANDARD HERD TEST.

Report for Quarter ended 31st March, 1924.

Cows to the number of 228 completed the testing term. Of these 183 qualified for the certificate. The individual returns are as follow :—

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
Mrs. M. I. Alston Estate, Cobram	Jersey ..	5	5	Silver Bell of Kameruka ..	6,038	10.4.23	247	24	7,683	5·84	448·75	250	511½	284, 383, 395
				Romany Girl 3rd of Tarnpirr ..	12,158	10.4.23	273	18	5,295	6·68	353·79	250	403¼	299
				Bonnie Annie of Aberdour ..	12,849	2.5.23	273	14	5,645	5·71	322·59	200	367¾	227
				Belladonna of Aberdour ..	10,127	22.5.23	273	17	5,458	5·77	315·08	200	359¼	232
				Welcome of Tarnpirr ..	7,069	28.5.23	273	17½	6,077	6·63	402·74	250	459	411, 350
W. H. Atherton, Murraydale	Jersey ..	1	1	Tiny of Beverley	13,323	13.5.23	273	7	3,655	6·31	230·71	175	263	
W. K. Atkinson, Swan Hill	Shorthorn	1	1	Pearl of Willow Park ..	10,266	10.4.23	273	30½	9,815	3·60	353·82	250	403¼	328, 393, 399
F. Austin, Lara ..	Jersey ..	2	2	Belle of St. Albans	9,429	13.6.23	273	17½	6,771	4·69	317·55	250	362	185
				Buttercup 2nd of St. Albans	10,137	26.6.23	273	26	6,442	5·00	322·20	250	367¼	
W. H. Axford, Camperdown	Jersey ..	1	1	Lady Elector 9th of Melrose	11,512	5.4.23	273	19½	6,279	5·37	337·15	200	384¼	

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
C. Bamford, Benalla	Ayrshire	12	12	Treasure of Medburn Grove ..	8,316	1.4.23	273	39½	10,789	4·61	496·88	250	569½	240, 385
				Pansie of Medburn Grove ..	4,860	2.4.23	273	22⅔	8,307	3·75	311·79	250	355½	319, 338, 368
				Beauty of Medburn Grove ..	4,858	5.4.23	271	19	7,584	4·63	350·80	250	400	261, 266, 335
				Pearl Beauty of Medburn Grove	Vol. XV.	14.4.23	273	15½	5,613	4·19	235·20	175	268¼	
				Bertha of Medburn Grove ..	10,741	18.4.23	273	15½	6,668	4·24	282·48	200	322	260
				Annie 2nd of Medburn Grove	10,740	24.4.23	273	13½	7,437	3·89	289·50	200	330	275
				Bonza of Medburn Grove ..	10,742	25.4.23	273	22½	7,733	3·77	291·65	200	332½	240
				Bloomer of Medburn Grove ..	8,298	30·4·23	273	25	8,098	3·75	303·23	250	345¾	209, 299
				Lady Mac of Medburn Grove	10,748	25.5.23	273	27	9,135	4·50	410·99	200	468½	296
				Babe of Medburn Grove ..	6,106	31.5.23	273	45½	13,811	3·91	541·01	250	616¾	283, 363, 475
				Linda of Medburn Grove ..	8,303	4.6.23	273	39	10,105	3·89	393·50	250	448¾	284, 355
				Miss Mac of Medburn Grove	10,749	16.6.23	236*	18½	5,690	3·99	227·02	200	258¾	263
Mrs. Irene Beard, Outtrim	Jersey ..	3	3	Daisy of Linga Longa ..	12,868	30.3.23	273	17½	4,301	5·40	232·16	175	264¾	
				Mary Birt of Kelburn ..	10,145	18.4.23	273	18½	5,831	5·12	298·67	250	340½	311
				Banksia of Springhurst ..	5,387	20.5.23	273	25	7,331	5·01	367·59	250	419	308, 406, 340 276, 393, 413
F. Bidgood, Staghorn	Jersey ..	2	2	Milkmaid of Staghorn ..	9,212	25.4.23	226†	17	5,108	5.25	268.02	250	305½	229, 341
				Sir Fancy's Larkspur of Staghorn	10,156	28.5.23	273	14	6,242	4·95	308·93	200	352¼	277
Mrs. Agnes Black, Noorat	Jersey ..	1	1	Noorat Grey Girl	6,412	24.6.23	273	11½	6,406	4·91	314·79	250	358¾	259, 292, 346, 354
A. A. Broad, Sutton Grange	Jersey ..	2	2	Mignonette of Harcourt ..	12,062	29.4.23	273	18	5,614	5·11	286·35	175	326½	
				Preston Daisy Girl	12,063	4.5.23	273	18½	5,339	4·97	265·56	175	302¾	
Callery Brothers, Bannockburn	Ayrshire	3	2	Ada of Langley Park ..	8,542	3.5.23	273	13½	6,604	4·35	287·04	200	327¼	298
				Marjorie of Langley Park ..	2,839	12.5.23	273	34½	11,074	3·80	420·47	250	479¼	401, 441, 403

* Sold before completing full term. † Withdrawn, sick.

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
Mrs. M. E. Carroll, Tyntynder Central	Red Poll	1	1	Carolina	346B	1.6.23	273	13	4,741	4·42	209·34	200	238¾	210
A. E. Castle, Swan Hill	Jersey ..	1	1	Tessie of Sunnyside ..	7,688	20.4.23	273	15	6,234	4·06	252·93	250	288¼	
J. Chadderton, Hamilton	Jersey ..	1	1	Princess of Strathbow ..	10,434	9.4.23	273	17½	6,246	4.88	303.50	200	346	213
J. P. Chirnside, Oakleigh	Jersey ..	2	2	Canary of Lesterfield ..	10,266	29.5.23	233*	33½	8,614	5·34	459·68	250	524	250, 274
				Countess 3rd of Lesterfield ..	12,164	17.6.23	273	16	4,839	6·52	315·39	175	359½	
R. C. Clymo, Bamawn	Ayrshire	1	1	Princess of Omakau Vale ..	8,866	12.5.23	273	9½	3,886	4·64	180·29	175	205½	
Clyne Brothers, Tinamba	Jersey ..	1	Nil											
Cockbill and Gibbs, Rockbank	Ayrshire	6	Nil											
E. A. Denis, Swanpool	Jersey ..	5	4	Primrose of Swansea ..	Not yet allotted.	23.5.23	223*	9½	3,156	5·63	178·20	175	203¼	
				Foxglove 3rd of Tarnpirr ..	10,493	17.6.23	273	17½	6,237	5·93	369·88	200	421¾	265
				My Hope of Kameruka ..	6,032	21.6.23	273	10½	5,190	4·92	255·11	250	290¾	335, 336, 392, 290
				Keepsake of Tarnpirr ..	7,056	25.6.23	273	18	7,282	5·15	374·82	250	427¼	294, 304

* Died before completing full test.

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
Department of Agriculture	Red Poll	9	9	Cutty	490D	1.4.23	273	23½	9,699	4·48	434·57	250	495½	287, 388, 454 443, 441, 450, 266
				Victoria Velvet	7AA	7.4.23	273	13½	6,318	4·43	279·98	200	319¾	264
				Beltana	239A	18.4.23	273	22½	7,650	4·25	324·78	200	370¼	269
				Ontario	399C	23.4.23	273	20½	7,864	3·98	313·20	250	357	200, 323, 304, 249, 362, 315, 340
				Tonga	253A	3.5.23	259	10½	6,795	4·05	275.44	250	314	293, 349, 384, 424, 408, 513
				Three Castles	402C	10.5.23	273	23½	6,981	4·31	300·91	200	313	200
				Pico	250A	10.5.23	273	27	9,884	3·92	387·02	250	441¼	279, 383
				War Wings	259A	20.5.23	273	30½	10,559	4.15	423.94	250	483¼	289, 339
				Tigra	324B	3.6.23	273	27½	9,689	3·61	350·16	200	399¼	305
	Friesian	2	1	Dominion Coringa	380	3.5.23	273	16	11,404	3·79	431·73	250	492¼	481, 460, 499, 484
	Jersey	1	..	Collingwood's Beauty	6,749	30.3.23	273	17	5,015	6·12	306·90	250	350	357, 257, 385
H. Dettmann, Kyneton	Jersey	1	..	Buttercup 3rd of Bonshaw	7,099	15.6.23	273	12½	4,697	5.35	251.11	250	286¼	211
C. Deverell, Wangaratta	Jersey	6	6	Dianthus of Methven	12,174	30.3.23	273	14	4,555	5·66	257·64	175	293¾	
				Gold Bell of Methven	9,293	31.3.23	273	39	10,948	4·72	516.92	250	589½	413, 516
				Colina of Methven	12,906	24.4.23	271	13½	4,830	6·39	308·41	175	351¼	
				Brighton Princess of Springhurst	5,391	6.6.23	273	6½	6,789	5·10	346·27	250	394¾	293, 270, 281, 509, 441
				Gold Bird of Methven	13,713	18.6.23	273	15½	6,397	5·71	365·50	200	416½	329
				Lantana 2nd of Springhurst	10,446	10.6.23	273	14½	6,397	6·42	410·53	200	468	375
P. J. Ducat, Shepparton	Jersey	1	1	Ruby of Jersey Vale	10,359	1.4.23	273	13	4,977	4·98	247·79	200	282½	166

NATIONAL MUSEUM MELBOURNE

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
S. H. Ebery, Newstead	Shorthorn	1	1	Sultan's Daisy	Not yet allotted	11.6.23	273	14	4,756	3·94	187·32	175	213½	
Evans Brothers, Lima East	Red Poll	2	1	Cherry Pie 2nd	130AA	15.4.23	273	22	6,160	3·76	231·81	175	264¼	
R. Faragher, Koroit	Jersey ..	2	1	Belle A	6,315	19.4.23	273	13	4,776	5·74	274·02	250	312½	305, 276
R. Ferguson, Riddell	Friesian	2	1	St. Albans Netherland Lily ..	655	20.4.23	273	12	7,709	3·45	266·37	175	303¾	
T. R. Findlay, Leitchville	Jersey ..	1	1	Dunalister Capture ..	10,370	10.5.23	273	20	6,875	4·58	314·95	250	359	
Flack and Sewell, Berwick— "Ardblair" Herd	Friesian	1	1	Dominion Queen Mercedes ..	262	17.6.23	273	58	21,374	3·37	719·58	250	820¼	352, 330, 590
"Burnbank" Herd	Friesian	6	6	Bainfield 40th	553	23.4.23	273	26	11,587	3·50	394·96	250	450¼	307, 304
				Monavale Catriona Paxton ..	551	25.4.23	273	16½	11,651	3·66	426·50	250	486¼	356, 412
				Burnbank Mercedes Violet ..	1,093	1.5.23	273	4	9,348	3·53	330·20	200	376½	288
				Holland Lass 2nd of Berry ..	244	1.5.23	273	24	15,791	3·58	565·56	250	644¾	204, 419, 404
				Monavale Amethyst Paxton ..	148	18.5.23	273	20½	10,987	3·95	434·05	250	495¾	365
				Springfield White Posch ..	566	7.6.23	273	11½	8,370	3·96	331·74	250	378¼	217, 296
With A. V. Becher	Friesian	1	1	Ashlynn 58th	1,088	26.5.23	273	23	8,681	3·65	317·05	200	361½	266
With J. T. Tweddle	Friesian	1	Nil											

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
M. and W. A. Francis, Kilcunda	Ayrshire	2	Nil					lbs.	lbs.		lbs.	lbs.	lbs.	
G. Gange, Mininera	Ayrshire	1	1	Alvie of Roseleigh	7,296	18.5.23	273	22½	10,225	4·23	432.18	250	482½	331, 354
H. S. Gibson, Murraydale	Ayrshire	3	3	Floe of Evergreen	11,053	15.5.23	273	11½	5,060	4·71	238·54	200	272	280
				Dorrie 2nd of Evergreen ..	9,112	10.6.23	273	16	5,106	4·08	208·58	175	237¾	
				Dairymaid of Evergreen ..	7,317	11.6.23	273	17	6,829	3·95	269·48	200	307	264
O. G. Handbury Toora	Jersey ..	2	2	Princess 2nd of Strathbow ..	12,206	16.5.23	273	18	5,962	5·79	345·01	175	393½	
				Jessie 33rd of Melrose ..	13,422	16.6.23	273	12½	4,028	6·36	256·07	175	292	
T. Harvey, Boisdale	Jersey ..	2	2	Kirsty 7th of Jerseyholm ..	5,918	19.4.23	273	14	6,117	5·93	363·02	250	413¾	331, 400, 411
				Kirsty 6th of Jerseyholm ..	4,980	31.5.23	273	17½	5,096	6·45	328·53	250	374½	347, 447, 414, 442
W. Henderson, Grasmere	Ayrshire	8	2	Gertrude of Carracoorte ..	9,374	4.4.23	273	11	4,265	4·52	208·97	175	238¼	
				Bud of Carracoorte ..	3,972	1.5.23	273	19½	6,740	3·81	256·98	250	293	219, 239
R. J. Henry, Euroa	Jersey ..	2	2	Coleus of Springhurst ..	7,325	10.4.23	273	20	7,740	6·57	508·26	250	579½	179, 402
				Myrtle of Springhurst ..	7,331	30.4.23	273	18	8,118	5·93	481·09	250	548	146, 349
J. A. Huffer, Gormandale	Jersey ..	2	2	Dunalister Mannakin's Sand Daisy	10,399	15.4.23	273	14½	4,348	6·03	262·29	175	299	
				Waverley Lass 3rd of Melrose	6,312	29.4.23	273	18½	6,011	6·42	385·99	250	440	269, 350, 395, 392, 403
J. Hutchinson, Somerville	Jersey ..	1	1	Northwood Queen of Somerville	9,417	21·4·23	273	33	9,587	4·90	469·33	200	535	337

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
A. W. Jones, Whittington, near Geelong	Jersey ..	7	7	Maid 2nd of Linden ..	8,437	8.5.23	273	18	5,870	5·90	346·44	200	395	273
				Mystery 22nd of Melrose ..	8,422	12.5.23	273	14	6,428	6·59	423·80	200	483	325
				Beauty of St. Albans ..	10,271	12.5.23	273	17	6,919	5·52	381·66	200	435	330
				Lilac of Tarnpirr	6,028	14·6·23	273	19½	7,304	5·02	366·71	250	418	325, 164, 424, 287
				Fuchsia 13th of Melrose ..	6,300	15·6·23	273	19½	7,792	5·58	434·47	250	495½	355, 407, 439, 384
				Cream Belle 3rd of Gnarbrook	9,446	19·6·23	273	20	5,682	5·63	319·68	250	364½	315
				Thelma of Meryula ..	5,473	24.6.23	273	20½	7,832	5·11	400·54	250	456¼	405
	Friesian	3	3	Bell of Craigneil	1,031	28.3.23	273	19	9,000	3·65	328·58	250	374½	294, 275
				St. Albans May Queen ..	1,036	2.4.23	273	12½	8,721	3·59	313·19	200	357	275
				St. Albans Gem	358	8.5.23	273	29	13,537	3·41	461·97	250	526¾	312, 376, 431
E. Talbot Jones, Clematis	Friesian	2	1	Wild Tulip 2nd	1,041	25.4.23	273	16	5,523	3·72	205·45	200	234¼	
A. Joshua, Berwick	Jersey ..	1	1	Gaiety Girl 11th of Melrose ..	9,442	15.6.23	273	15½	5,613	5·95	334·03	200	380¾	249
Kerr Brothers, Bacchus Marsh	Shorthorn	6	5	Morven Pansy 7th	Not yet allotted	18·4·23	273	26	9,055	4·08	369·50	250	421¼	360, 363
				Morven Cressida	„	26.5.23	273	24	8,942	4·03	360·12	250	410½	245, 292, 368
				Morven Rose 13th	„	11.6.23	271	19½	5,544	3·82	211·51	175	241	
				Morven Pansy 8th	„	11.6.23	271	12½	7,804	3·63	283·09	250	322¾	276, 298
				Morven Duchess 14th ..	„	15.6.23	273	23½	9,028	3·82	345·07	250	393½	250, 290, 315
A. Kirby, Daylesford	Ayrshire	2	2	Lily of Wattle Bank ..	9,686	19.4.23	273	18	6,068	4·55	276·38	250	315	256
				Cissie of Wattle Bank ..	9,682	10.5.23	273	21	6,241	4·03	251·56	200	286¾	252
C. Lees, Lockington	Ayrshire	3	1	Ruby of Granite Park ..	6,996	23.4.23	273	12	4,792	4·14	198·32	175	226	

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
Lithgow and Benson, Yarra Glen	Jersey ..	2	2	Delphinium of Springhurst ..	10,442	25.4.23	273	5½	4,547	6·09	286·81	200	327	244
				Marguerite of Springhurst ..	9,658	20.6.23	273	11	6,284	5·80	364·23	250	415¼	268, 357
J. G. Lobb, Cardinia	Ayrshire	1	1	Woodbine of Seafield ..	3,299	26.4.23	273	13½	5,918	5·84	345·59	250	394	
Longerenong Agricultural College, Dooen	Ayrshire	7	4	Laurel of Longerenong ..	9,791	2.4.23	273	17½	6,029	4·41	266·19	200	303¼	
				Coral of Willowvale ..	5,346	16.4.23	261	4	5,544	5·07	281·49	250	321	
				Adeline of Ellerslie ..	4,387	11.5.23	273	17½	7,697	4·57	352·03	250	401¼	
				Maggie of Longerenong ..	9,792	14.5.23	273	13½	5,593	4·83	260·46	200	297	
H. Luxton, Whittlesea	Jersey ..	4	4	Audrey's Victress of Somerville	9,411	5.4.23	273	12½	4,868	5·62	273·47	250	311¾	242, 237
				Lady Grey 16th	15,223	18.4.23	273	15	5,259	5·75	302·31	200	344¼	240
				Trinket of Banyule ..	9,512	14.5.23	273	11	5,925	5·29	313·55	200	357½	275
				Syringa of Springhurst ..	9,665	15.5.23	273	11½	4,616	5·87	270·07	250	303¾	221, 281
C. G. Lyon, Heidelberg	Jersey ..	4	4	Molly 4th of Banyule ..	4,246	11.4.23	273	30½	9,966	5·07	505·24	250	576	302, 393, 415, 422, 404, 393
				Hawthorn 5th of Banyule ..	5,208	25.5.23	273	11½	5,773	5·18	299·11	250	341	286, 368, 394, 292, 374
				Loriana of Banyule	11,587	31.5.23	273	16½	5,130	5.61	287.58	175	328	
				Molly 9th of Banyule ..	9,500	3.6.23	273	12½	4,910	5.91	290·28	175	331	
L. McFarlane, Bundoora	Ayrshire	2	2	Coral of Banyule	11,258	1.4.23	273	17½	6,607	4·35	287·20	250	327½	
				Bud of Ayrbrae	7,561	6.4.23	218*	23	5,302	4·37	231·54	200	264	192
K. McGarvie, Pomborneit	Jersey ..	10	9	Tulip 3rd of Bonshaw ..	5,306	16.4.23	273	14½	6,597	4·04	266·86	250	304½	
				Modest of Greenwood ..	9,529	16.4.23	273	15½	6,567	4·88	320·49	200	365½	
				Lettie of Greenwood ..	6,129	21.4.23	273	15½	6,025	4·51	271·71	250	309½	
				Bumper 2nd of Greenwood ..	10,326	21.4.23	273	11	3,700	5.29	195·73	175	223½	
				Claribelle of Greenwood ..	5,302	22.4.23	273	16	7,404	4·39	325·13	250	370½	
				Madge of Greenwood ..	9,525	27.4.23	273	8½	6,493	4·66	302·77	200	345¼	
				Fairy of Greenwood ..	5,303	28.4.23	273	15½	6,907	4·05	279·44	250	318½	
				Amy 2nd of Greenwood ..	10,325	30.4.23	273	16	5,483	5·11	280·17	175	319¼	
				Amethyst of Greenwood ..	7,142	22.5.23	267	19½	5,989	5·73	343·11	250	391¼	

* Died before completing full term.

STANDARD HERD TEST—*continued*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
J. McKernan, Byrneside	Ayrshire	1	1	Boronia of Locheden ..	..	21.4.23	273	17½	6,095	4·15	253·23	175	398¾	
R. H. Maher, Wyuna South	Jersey ..	2	2	Laura of Rosemont	12,992	1.5.23	273	13	4,006	5·78	231·54	175	264	
				Jenny Lind of Rosemont ..	12,991	17.6.23	273	14	4,537	5·26	238·57	175	272	
W. R. Meredith, Ondit Shepparton	Ayrshire	2	Nil											
T. Mesley, Balyston	Jersey ..	1	1	Phyllis of Luscombe ..	5,254	27.5.23	273	24½	8,632	4·61	397·85	250	453½	341, 418, 400, 369, 422
Mrs. E. O'Donohue, Kilmore	Ayrshire	4	3	Blanche 4th of Glengowrie ..	3,842	5.5.23	266	7	6,934	4·20	291·01	250	331¾	
				Marjorie of Hill View ..	11,293	17.5.23	273	12	4,914	4·13	203·13	175	231¼	
				Marjory of Bessboro ..	10,093	18.5.23	273	10	6,823	4·23	298·82	250	340¾	
J. Plattfuss, Tongala	Friesian	3	3	Dot of Greenvale	App. 4	29.5.23	273	14	5,927	3·87	229·18	175	261¼	
				Westmere Oakwood Duchess	602	2.6.23	272	33½	9,307	3·42	318·07	200	362¼	352
				Springfield Ideal Keys ..	980	5.6.23	273	4	6,410	3·29	211·16	175	240¾	
R. Ralston, Moglonemby, near Euroa	Ayrshire	2	1	Petunia of Ben Kell ..	10,186	14.6.23	207*	20½	4,452	4·05	180·45	175	205¾	

* Sold before completing full term.

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
J. D. Read, Springhurst	Jersey ..	15	15	Alsyke 2nd of Springhurst ..	10,437	31.3.23	273	13	4,636	6·29	291·47	200	332½	255
				Nightshade of Springhurst ..	3,707	6.4.23	273	22	8,805	4·92	433·33	250	494	297, 230, 410, 419, 425, 421
				Sulla of Springhurst ..	12,224	9.4.23	273	12	4,969	5·02	249·66	175	284½	283, 455, 371
				Clover of Springhurst ..	6,201	14.4.23	273	17	6,833	5·45	372·62	250	424½	263, 206, 366, 355
				Monkshood of Springhurst ..	12,219	17.4.23	273	15	5,209	4·57	238·09	175	271½	
				Cosmos of Springhurst ..	10,441	19.4.23	273	16	5,973	6·43	384·32	200	438	262
				Belladonna of Springhurst ..	5,389	8.5.23	273	16½	7,467	4·78	357·19	250	407½	222, 253, 243, 399, 306
				Melilot of Springhurst ..	9,659	26.5.23	273	13	6,952	5·27	366·68	250	418	281, 350
				Countess 2nd of Springhurst	9,651	1.6.23	273	13½	7,496	5·29	396·46	250	452	290, 345
				Eidelweiss of Springhurst ..	7,327	3.6.23	273	13½	6,641	5·64	374·65	250	427	223, 394, 394
				Cornflower of Springhurst ..	7,326	7.6.23	273	16	7,592	5·49	417·09	250	475½	243, 385, 428
				Boltonia of Springhurst ..	9,449	7·6·23	273	19½	8,184	5·07	415·02	250	473	218, 294
				Romneya of Springhurst ..	9,663	8·6·23	262	4	7,792	5·66	440·72	250	502½	293, 394
				Princess 2nd of Springhurst	12,222	18·6·23	273	8¼	3,096	5·88	182·19	175	207½	
				Trefoil 2nd of Springhurst ..	9,666	26.6.23	273	8	5,960	5·97	346·01	250	394½	245, 373
Red Cross Farm, Bundoora	Friesian	1	Nil											
Miss Bruce Reid, Bundoora	Jersey ..	1	1	Jubilee Red Rose	7,346	8.6.23	273	21	8,054	5·24	422·38	250	481½	298, 356, 305
A. Robertson, Tooradin	Jersey ..	3	1	Joan of Hill crest	7,036	3.4.23	273	19½	5,392	4·71	253·97	250	289½	
G. Rowe, Kardella	Jersey ..	2	Nil											
A. H. Schier, Kernot	Ayrshire	6	2	Scotswood Netty	10,313	31.3.23	273	21	5,559	4·44	246·59	175	281	
				Scotswood Lotina	10,299	5.5.23	273	20	5,548	4·00	221·88	175	253	
J. Scott, Heidelberg	Jersey ..	2	2	Irish Eyes of Elouera ..	9,699	17.4.23	273	13	4,544	6·30	286·17	200	326½	236
				Forty Winks of Targoora ..	9,698	24.4.23	273	24	7,514	5·33	400·45	250	456½	326

STANDARD HERD TEST—*continued.*

Owner.	Breed.	No. completed Test.	No. Certificated.	Name of Cow.	Herd Book No.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.	Previous Butter Fat Records in lbs.
								lbs.	lbs.		lbs.	lbs.	lbs.	
Mrs. D. Stark, Wando Vale	Jersey ..	1	1	Bride of Comely Banks ..	10,230	26.6.23	273	14	5,054	5·39	272·66	175	310¾	
O. J. Syme, Macedon	Friesian	2	2	Eco-Sylv Belle (imp.) ..	1,256	27.4.23	273	27½	15,178	3·73	566·41	200	645¾	
				Bolobek Anabel	317	7.6.23	273	15½	11,079	3·72	412·64	250	470½	305, 390, 380, 365
A. G. Tedcastle, Toolern Vale	Friesian	1	1	Melba	1,055	30.5.23	273	22	9,851	3·27	322·16	250	367½	299, 366, 339, 326
W. Tendeson, Lilydale	Jersey ..	1	1	Una 2nd of Hillcrest ..	13,406	22.6.23	273	16½	5,921	4·79	283·34	175	323	
L. W. Thompson, Pakenham	Jersey ..	1	1	Vanilla 15th of Melrose ..	10,525	29.4.23	273	14	4,553	6·51	296·28	175	337¾	
J. Thorburn, Woodend North	Ayrshire	2	1	Oatlands Annie	6,926	9.4.23	273	13½	6,137	4·77	292·45	250	333½	286
T. Trevaskis, Tongala	Jersey ..	2	2	Daisy of Ballara	13,032	29.5.23	273	10½	4,353	5·54	241·34	175	275	
				Souvenir of Ballara	13,033	10.6.23	273	7½	3,361	5·76	193·75	175	221	
J. C. Wade, Camperdown	Jersey ..	1	1	Dulcie of Colac	9,300	2.4.23	273	20	5,863	5·39	316·25	175	360½	
A. L. N. Walter, Little River	Jersey ..	2	2	Daisy of Paradise	13,037	9.5.23	273	13	4,684	5·16	241·86	175	275¾	
				Rosebud of Paradise ..	13,038	19·5·23	273	10½	3,174	5·91	187·73	175	214	
H. Webb, Sunbury	Ayrshire	1	1	Model of Holly Green ..	6,953	15.4.23	273	18	8,537	3·89	332·50	200	379	307
J. Wills, Bacchus Marsh	Friesian	2	Nil											
W. Woodmason, Oakleigh	Jersey ..	3	3	Laura 13th of Melrose ..	10,523	28·4·23	273	15	5,329	6·14	327·29	200	373	
				Handsome Girl 10th of Melrose	10,521	19.5.23	273	16	6,113	6·37	389·52	200	444	298
				Flower 15th of Melrose ..	10,520	11.6.23	273	16½	6,466	6·09	393·78	200	449	

BREEDING AND MANAGEMENT OF DUCKS.

By H. F. Clinton.

Duck raising can be conducted successfully in a small way either as a side line or as an adjunct to other branches of poultry farming, but on a large scale it is a business requiring capital and wide experience. The cost of feeding the growing ducklings, and of maintaining the breeding stock during the rest of the year has to be considered, as during this time there is little return for eggs, and the cost of production is high. A small flock kept under ideal conditions would be the best to commence with, as the beginner must start in a small way, and extend as he gains in experience. Ducks can be raised at a profit on the general farm, and, though not as great a source of income as fowls, serve to add variety to the meat and eggs on the farmer's table.

A suitable site for a duck farm is a gentle easterly or north-easterly slope with light sandy soil, and there should be land provided sufficient for the growth of green food. Shade is essential, and the birds should be protected from the cold winds. The ducks should be bedded down with sawdust, straw, or other litter during the laying season so as to keep the eggs clean. Ducks lay their eggs early in the morning, and they should therefore be kept confined to their houses or pens until 9 or 10 a.m., and all the eggs will then be laid in the houses. They begin to lay when between five and five and a half months old. Ducks and fowls should not be run together. In handling the birds pick them up by the neck rather than the legs, as the latter are apt to break easily. Cleanliness and strict attention to detail are necessary to complete success.

Breeds.

With the exception of the Muscovy, all our economic breeds of ducks are said to have originated from the Mallard or wild duck. There are two general classes—the meat class, which includes the Aylesbury, Pekin, Rouen, and Muscovy; and the egg class such as the Indian Runner.

AYLESBURY AND PEKIN.

These breeds are the most popular of the heavy varieties, and are suitable for the market, for export, and for table use. On account of the yellow colour of the flesh of Pekin ducks, they are generally crossed with an Aylesbury drake, a cross which matures quickly, and grows to a large size, with flesh of a good flavour, colour, and texture. Pure bred stock should be purchased, and the eggs hatched from birds on one's own farm.

MUSCOVY.

Muscovy ducks, whether pure bred or crossed with Pekins or Aylesburys, have very deservedly acquired a reputation for table purposes, and when fattened and dressed are very attractive in appearance. They would not, however, find such a ready sale on the English market in competition with Aylesburys and Pekins. Muscovy ducks have a quiet

temperament, and do not run about much, or lose condition by excessive exercise. Hence they can be kept with fair success while the local prices are good. They are good sitters and careful mothers; and divide into two general varieties—white and coloured.

Indian Runners.

This breed is noted for its great laying qualities. There are three principal varieties, the white, the fawn, and the fawn and white. Although the quantity of flesh on them is not nearly equal to that on the larger breeds, a well fattened Runner is very fine eating. Where it is desired to run only a few ducks about the general farm or in the orchard, this breed is very suitable.

White Runner.

Fawn and White Runner.

Accommodation.

The site for the houses must be dry, well drained, and raised a little above the general level. Buildings and pens should be constructed on labour-saving principles. Fairly open houses should be provided for the breeding ducks, and simple open fattening pens or houses for market birds. A ground floor is the best for ducks. This can be constructed of clay, well rammed down, and when dry covered with tar and earth, or sand. Duck houses 10 feet deep, 16 feet long, 7 feet high in front, and 6 feet at the back, with yards 16 feet wide and 60 feet long, will accommodate about 50 ducks. Wire netting can be used to confine them to their various yards. Suitable small ponds to serve two yards can be constructed of brick and concrete, 3 feet wide, 6 feet long, and 9 inches deep. They should be sloped at each end in order that they may be easily cleaned.

Young Aylesbury Duck—Weight 9 lbs.

Young Pekin Duck—Weight 8 lbs.

Breeding.

The best results are obtained by mating ducks of from two to three years old with a drake between one and two years old. The male birds used should be selected from a high egg-producing strain. The strongest ducklings are produced from eggs of well matured, strong, and vigorous stock. With one drake about three ducks can be mated in the heavy breeds, and as many as six in the lighter breeds. Ducks in breeding pens should be kept strictly to themselves, and comfortably housed in cold weather to ensure a normal egg supply. About 25 ducks should be run in each pen. They should not be forced in any way, and laying should be delayed until the breeding season of July, August, and early September. Ducks that have access to water reproduce more satisfactorily and lay a greater number of fertile eggs.

Incubation and Hatching.

Ducklings can be successfully hatched in incubators under the supervision of skilled poultrymen. They can also be hatched under hens, and brooded in the same way as chickens. The same general principles apply to the incubation both of duck eggs and those from fowls; but it is usual in the case of duck eggs to run the incubator at a temperature about 1 degree lower than that necessary for hen eggs. The directions supplied by the maker of the incubator can be followed in this respect. Most operators prefer to use the moisture tray during hatching, and the time the moisture should be supplied is governed largely by the situation of the incubator room and the locality of the farm. In localities with a dry atmosphere such as that north of the Dividing Range, a means must be found to increase the humidity in the machine either by wetting the floor of the room or supplying extra moisture in the machine. Eggs should be turned twice daily from the third to the twenty-sixth day inclusive, and the direction of the tray reversed each time the eggs are turned. The time necessary for the eggs to cool depends upon the temperature of the incubator room and the day of incubation, but a good general plan is to leave them out of the incubator for five minutes during the first week up to twenty-five in the last week. The eggs should be tested on the seventh and twenty-first days, and those infertile or with dead germs removed. All breeds, with the exception of the Muscovy, which require an extra week, hatch out in about 28 days. Muscovys usually hatch under the ducks themselves. All that is necessary to make a nest for the Muscovy duck is to place in a convenient position a box or small cask containing a little sand and litter. The duck will complete her own nest. Aylesbury, Pekin, and Indian Runner ducks rarely sit, and if natural methods of incubation are to be used, they are hatched under Muscovy ducks or hens. This is a satisfactory method for the beginner, and in other cases where small numbers are concerned.

Rearing.

Where ducklings are raised on a large scale, the hot water pipe system is installed in a regular long brooder house. The brooders are the same as for chickens except that they should have more over-head room; the distance between the heating pipes and the floor should be about 8 inches. The temperature should be about 90 degrees F.

for the first three days, and then can be gradually reduced. Between 30 and 50 is the number for each compartment. After the third week they can be removed to a warm place, and when they are half-grown can be removed to colder quarters. If they are to

A Nice Flock of Muscovys.

be reared in large numbers with coke-burning colony brooders, they can be kept in lots of 200 till they are two and a half weeks old, and thereafter should be separated into smaller lots until at a month old they are in lots of 50. Ducklings require careful attention up to about

a month old, and after that they are very hardy. On a small scale the newly-hatched ducklings can be kept in batches of about 50, housed in suitable accommodation, preferably with short litter, on which to camp at night, which should be kept dry.

Muscovy ducks are best reared with the mother duck until they are from three to four weeks old. Young ducklings should not have free access to water until they are at least four or five weeks old.

Feeding.

A variety of food should be given to the ducks during the breeding season, as a vigorous condition is necessary to fertilize the eggs. Ducks intended for breeding should not be forced, but fed on a moderate ration made up as follows:—Pollard 3 parts, bran 1 part, coconut oil cake 1 part, and green stuff 5 parts.

For the first 50 to 56 hours all that the young ducklings require is a little sand placed on a bag, and drinking water slightly warmed. After that they can be fed on 1 part pollard, 1 part bran, and 1 part day-old chick feed mixed with skim milk, and fed to the birds in a crumbly condition. For the first few weeks it is not advisable to allow much animal food.

When young ducks are intended for market, they should be matured as quickly as possible. They should be penned in lots of 25, and as evenly in size as possible, otherwise the smaller ones will not get as much food as the larger, and their growth will be retarded. The best food is pollard, barley meal, bran, rendered fat, and skim milk. If perfectly fresh cut green bone can be procured, it can be given twice a week in their morning mash at the rate of ½ oz. per bird. It will promote growth and prevent leg weakness.

To start young ducks laying use maize meal with a little fresh cut green bone in their morning mash for the winter months.

The best food for fully matured ducks is 2 parts pollard, 1 part bran, and 1 part chaffed green stuff. The bran should be moistened with soup or milk if it is available, and dried off with pollard to a nice, crumbly condition, and the green stuff then added. The food can be fed in troughs, and it is advisable to see that none is left over, as it may become sour, and cause bowel trouble. Animal food is a great aid to egg production, and it should be given in a cooked form at the rate of ¾ oz. per bird three times weekly. The best green food is maize (cut young), silver beet, lucerne, rape, green barley, and green oats.

Good clean food only should be given, and a plentiful supply of shell grit and clean water should always be available. The water should be deep enough to enable the ducks to keep their eyes and beaks clean. If the soft food is allowed to collect about their eyes, it gives them an unsightly appearance and renders them liable to ailments of the head and eyes.

Marketing.

Pekins and Aylesburys can be marketed when they are from nine to twelve weeks old, and weigh from 4½ to 6 lbs., occasionally more. After the age mentioned the flesh deteriorates, and their weight decreases. Muscovys must be retained until they are between fourteen and sixteen weeks old. At this age they will, of course, be somewhat heavier than Aylesburys.

When ducks are being marketed they should, of course, be graded evenly as regards age, weight, and condition. Condition and uniformity are the qualities required to command top prices. Care should be taken not to place too many in one crate.

Ducklings for the English market are shipped from Melbourne during the months of November, December, and January.

Diseases and Parasites.

It is almost useless to attempt to cure any serious disease in ducks, and consequently the old motto—prevention is better than cure—applies with double force. The principal ailments met with are:—

White Eye.—This is a disease analogous with roup in fowls. It is very contagious, and is usually caused by overcrowding, and insanitary and damp conditions.

Staggers.—Ducklings that have been poorly fed, and not allowed a regular supply of drinking water often develop this complaint. In other cases it may be due to the absence of shade during hot weather.

Diarr.—This trouble is usually the result of feeding sour or mouldy food.

Leg weakness and cramp due to damp conditions of housing, or to the drinking of very cold water, or chills, and which may result in pneumonia, are complaints the prevention of which is known.

Lice and mites are not usually a serious consideration.

PROTECTION OF USEFUL INSECTS, BIRDS, AND ANIMALS.

In view of the large settlement now taking place in our country districts, it behoves settlers and farmers to exercise a judicious care in the destruction of native insects, birds, and animals.

The problem of insect control is largely influenced by the action of the checks provided by Nature on the increase of insects. This is termed "The Balance of Nature."

The most obvious check is that due to birds, bats, lizards, and other animals. There is also the less evident, though equally efficacious check from the hosts of predaceous and parasitic insects which attack their fellows. The predaceous insects are those which devour their prey from the outside, the most important among which is the great lady-bird family (*Coccinellidae*). The true parasitic class are those which work in or on the body of their host. These latter are often microscopic in size, but are amongst the most effective of our insect friends. All insects tend to increase very much, and in natural conditions have to maintain their position against such influences as climate, weather, variable food supply, &c., and against their natural enemies. It is found under natural conditions that these factors tend to keep the numbers of any species within certain limits, though not always as narrow as we could wish.

When land is put under cultivation, the timber removed and foreign plants introduced, the balance of nature is disturbed, and the influence of beneficial birds and other insect enemies becomes altered. Man has then to fight not only the number of injurious insects that would

be found under natural conditions, but also the increase due to the conditions he creates. He further has to cope with other introduced insects, which, owing to the absence of their natural insect enemies prove most difficult of control. Direct artificial checks then become necessary, but these may be reduced to a minimum by affording every encouragement to all natural checks. In fact, in many instances, if the natural checks are destroyed, we are powerless to control the pest.

It is, of course, impossible to avoid creating artificial and unnatural conditions in cultivated land, and man can only attempt to render these as favorable as possible to the maintenance of a natural balance of insect life. In order to effect this, every insect destroying creature should be encouraged unless it is proved that it has some bad habit which offsets its value as an insect destroyer.

It is frequently found that man himself, in shooting or trapping birds or by destroying their nests, is doing much to destroy bird life, which is of much value to him, and such practices may be more effective in driving away bird life than the artificial conditions which attend cultivation. Where birds, lizards, toads, frogs, &c., are allowed to live unmolested, they soon accustom themselves to altered conditions, due probably to the abundant supply of insect food found in cultivated lands. We have in our own State many examples of where an insect has changed its native food for an introduced one. The Spring Beetle (*Colombymorpha lineata*) is a good illustration. This beetle in the adult stage attacks the blossoms and fruits of many orchard trees, causing considerable losses in some years. The wants of the Spring Beetle were at one time met by the supply of native bloom, but owing to the clearing of the country much of this has been cut out. Again, the clearing of the land has meant more grass lands, thus giving greater facilities for the breeding of this beetle, which in the larval or grub stage feeds on the roots of grass and shrubs. The bird life has also probably been reduced by the invasions of man and the attack of the escaped domestic cat. The beetle reported as responsible for the destruction of the mulga in the Murchison and other districts is another instance. The increase of this beetle is due to two main factors, namely, heavily stocking the country, which prevents the young plants from maturing and producing vigorous resistant trees, and the destruction of the native birds by cats. Then we have the effect of the introduction of insect and other pests per medium of trade. An insect like the Fruit Fly was introduced in imported oranges from the Mediterranean, and without any of its natural enemies is now a serious pest. The Potato Moth, all our orchard scales, aphides, and many other introduced pests, necessitate much labour and expense to control artificially owing to their having no natural enemies among the insects in this State.

Birds are an important and efficient check upon insect multiplication. It is doubtful if anywhere in the animal kingdom a restraining influence so important can be found. The effect of the bird upon an insect is to destroy it at once. When attacked by an insect parasite, the pest in many instances continues its destructive work until the larvae is full grown, the parasite only preventing a future generation, whereas the bird at once ends the destructive powers of the particular insect consumed. Another point in favour of birds as against insect parasites is their ability to travel long distances; they are able to rally quickly to any place and render good service in checking the further increase of the pest.

It may be contended that birds are indiscriminate, and will eat insects without regard to species or to their economic significance. It is quite true that in a bird's daily diet many useful insects are destroyed, but the true function of insectivorous birds is not so much to destroy this or that pest as it is to lessen the numbers of the insect tribe as a whole. That this is the true relation of birds and insects is proved from the fact that the two have lived together for countless ages, and the balance of nature has been preserved until disturbed by the operations of man. Birds have not wholly destroyed predaceous and parasitic insects on the one hand, nor have they exterminated any vegetable-eating pest, but they have successfully held the balance between the two. If we use artificial methods we still have the objection that both useful and destructive insects are destroyed. There is probably no way of destroying insects on a large scale that is not open to the objection that it kills friends as well as foes. Nature destroys indiscriminately, but produces in the long run the greatest good to the greatest number.

Many fruit-growers condemn the Silver Eye (*zosterops Gouldi*) because it destroys during the months of January to March a small percentage of soft fruits. The bulk of the food found in the stomach and crop of this bird is insect, particularly Scales and Aphides. The indiscriminate destruction of the Silver Eye or any other insect-eating bird may lead to a disturbance of the balance of nature.

The Crow (*Corvus coronoides*) has also been condemned by many people as a purely destructive bird and one that should be destroyed. The main charge against the crow is that it destroys young lambs, but it is a well-known fact that the lambs and ewes attacked are generally weaklings, and therefor it is to the ultimate advantage of the flock when they are eliminated.

We are experiencing an increasing plague of blowflies each year which cause considerably more damage to our flocks than the crows. Unfortunately the destruction of the crow is more systematically carried out by many farmers than the destruction of the blowflies. In many cases crows are shot indiscriminately, but the dead birds are left unburned, and provide a breeding ground for innumerable blowflies, which in the end prove a greater curse, and infinitely more destructive pest than ever the crow can possibly become. The annual losses caused to flock owners by the crow fades into insignificance when compared with those caused by the blowfly. There is no sweeter morsel to a crow than a good fill of fly maggots. I have seen crows so full of maggots that they were scarcely able to rise on the wing. When we realize that a single blowfly can lay up to 1,000 eggs, it is obvious what benefit the crow is in destroying this disgusting and destructive pest. The crow is also responsible for the destruction of grasshoppers, cut-worms, &c.

One of the main factors in destroying the balance of nature in this State is the escaped house cat or domestic cat. This animal has increased in all districts, and was up till recently a protected creature. Unfortunately, the purpose for which the cat was protected—the destruction of young rabbits—has not been as effective as was anticipated. The cat has shown a greater preference for the feathered tribe, and will, whenever opportunity offers, destroy them. The destructive nature of the cat makes it a doubly dangerous enemy, in that it will destroy life merely to gratify its passion for killing. It is safe to say that cats

destroy in the aggregate more birds than all the native natural enemies combined. The offender is usually not the well-fed household pet, but those which have escaped into the bush, where they breed, become numerous, and destroy the native bird life. Cats will frequently devour frogs and toads and lizards, which are amongst our most useful insect destroyers. Sportsmen and bird lovers should therefore destroy the bush cat wherever possible.

In conclusion, it is suggested that every effort be made to interest and educate the public, particularly the young in the protection and recognition of our beneficial or friendly insects, birds, and animals. By so doing so many of the dangers and errors of the past can be prevented, and much time, labour, and loss prevented. The general tendency to-day to destroy ruthlessly and indiscriminately has frequently the opposite effect to what is intended.

—From the *Journal of Agriculture*, W.A., April, 1924.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

PLANTING.

The time has now arrived for the general planting of deciduous fruit trees. The soil should have previously been well ploughed and subsoiled, and, as far as possible, drained. To insure satisfactory results, it is essential that the orchard be subsoiled. Where expense is a consideration, drainage may be left for subsequent years, but once the orchard has been planted, it will be impossible to subsoil.

When planting out, the distance between the trees will be determined by the kinds to be planted. For ordinary deciduous fruiting trees it is the custom in this State to plant them 20 feet apart in the rows, the rows also being 20 feet apart. Results have proved this to be a satisfactory practice. Almond trees may be planted 15 or 16 feet apart each way, while walnuts and citrus, owing to their spreading habit, often require a distance of 30 feet.

Deep planting is not advocated, the general practice being that the depth of planting in the nursery should be followed. If holes be dug, they should be shallow, the bottom being merely loosened to allow a comfortable friable bed for the tree roots. A good practice is to dig the whole strip along which the trees are to be planted, merely removing sufficient soil afterwards when planting. Another satisfactory custom is to plough furrows 20 feet apart, and to plant the trees in the furrows, filling in the soil over the roots and trampling well down.

Before planting, the roots of the young trees should be well trimmed, shaped to an even form, and cleanly cut. As the result of their removal from the nursery beds, the roots are generally more or less damaged, and numbers of the fibrous roots, becoming dry, shrivel and die. These all require a clean trimming. Then it is often desirable to remove some

of the roots so as to balance the root system. The trimming of the roots gives the young tree a clean root system, and it is enabled to establish itself with young, vigorous roots.

After planting, the top should be well cut back, so as to leave three or four arms, with three or four buds on each. Where it is not possible to have this number of arms or limbs it is frequently advisable to cut back to one stem, allowing the buds to break out strongly and frame the tree after planting. In some countries, the custom of not cutting back the trees the first year is favoured. Local experience has not resulted in favour of this practice, as it is found to be inadvisable to unduly strain the young tree by leaving a heavy top to be supported by the weak-growing root system.

A number of good commercial fruits have been found to be either wholly or partially self-sterile, requiring other varieties near them to enable them to set their fruit. For this purpose it is necessary that the bloom periods should be somewhat coincident.

SPRAYING.

The time has now arrived when it is necessary to spray for the following pests—scale insects, woolly aphis, and the bryobia mite. The use of red oil has been advocated for these pests, and, as well, crude petroleum, kerosene and other oil emulsions have proved satisfactory.

The lime-sulphur spray is also one of the most effective of sprays for winter use. It is lasting, searching, and being a fungicide as well as an insecticide, is much favoured by growers as a dual spray.

Nicotine sulphate in any form, such as Nicoton or Black Leaf 40 may also be used.

GENERAL WORK.

All ploughing should now be completed; if not, it should be finished before spraying and pruning operations are proceeded with.

Any autumn manuring or liming should also be now carried out. This, too, should be finished before spraying or pruning. Before spraying with oils or with lime sulphur wash, all rough bark on apple and pear trees should be scraped off. This will mean the certain destruction of any codlin moth larvæ hiding underneath.

The Vegetable Garden.

If not previously done, asparagus beds should be well cleaned out, and a top dressing of manure given. To insure good drainage, the soil from the paths, or between the beds, may be thrown up on the beds, so as to deepen the surface drainage, and to consequently warm the beds. This will mean earlier growths. A heavy dressing of manure should be given, and the beds well and roughly dug over.

Plant out seeds of tomatoes and the pumpkin family in the frames; and sow in the open seeds of peas, lettuce, spinach, broad beans, radish, onions, carrot and leek. Asparagus crowns, rhubarb roots, tubers of Jerusalem artichokes, shallots and onions may now be planted out. Celery should still be earthed up, taking care not to have the beds too wet. Rhubarb beds should be well manured.

The Flower Garden.

General cleaning up and digging will be the work for this month in flower section and shrubbery. Where the soil is heavy or sour, or where

sorrel is plentiful, the garden should be given a heavy dressing of fresh lime, a fair dusting being applied all over the surface. Lime should not be used in conjunction with leaves, garden *débris,* leaf-mould, stable manure, or any other organic matter used for humus. These should be first disposed of by digging well into the soil; then shortly afterwards a top dressing of lime may be given. Should no humic material be used, the lime may be dug in with the autumn digging.

In cleaning up gardens, all light litter and foliage should be either dug in, or, better still, it should be placed in an out-of-the-way corner to form a compost heap. Leaf-mould, well rotted, is especially useful in any garden, particularly where such plants as Azaleas, Rhododendrons, Liliums, &c., are grown, or for pot plant work it is exceedingly valuable. Lime must be kept away from these plants. In forming the compost heap, no medium whatever should be added to help the rotting down of the leaves unless it be a little sand. Any chemical added will render the mould unsuitable for its special objects.

Any hardy annuals may be planted out, such as stocks, pansies, wall-flowers, &c., and cuttings of roses and hardwood shrubs may also be planted. In planting out cuttings it is very important that all the eyes should be removed from the part of the cutting which is to be below the ground. If this be not done, there will always be the subsequent danger of the plant suckering.

Roses and any summer and autumn flowering shrubs that have finished flowering may be pruned. If the spring flowering shrubs have not previously been pruned, they should be allowed to remain until after the next flowering season. This especially applies to such plants as Spireas, Philadelphus (Mock Orange), Deutzia, Prunus Mume, and other early flowering shrubs. To prune these now would mean the certain loss of a great proportion of their flowers.

REMINDERS FOR JULY.

SHEEP.—Class all sheep, whether crossbreds or merinoes. Market any aged or inferior woolled sheep that may be fat before prices recede in the spring. Discard all undersized, narrow-framed sorts, any with short yellow fleeces, very coarse, common woolled crossbreds, any with very fine, mushy, light fleeces, ewes with deformed udders, single teats, deformed mouths, ewes six years old and over. When classing merino and comeback weaners look out for those thin and wasty on withers between the hips, and below; they are unprofitable shearing sheep. Draw teeth of aged ewes altogether if feed slipping through. Use a neat ear-mark for lambmarking, not the "slash," "crop," and other unsightly marks. Consider well before selling early-born, good-fleeced ewe lambs this coming season. Select best rams for future use, and dispose of any too old, or in any way undesirable. Remember wide, thick sheep are best thrivers, but they must carry superior shafty fleeces as well.

CATTLE.—Cows, if not housed, should be rugged. Rugs should be removed and aired in the daytime when the shade temperature reaches 60 degrees. Give a ration of hay or straw, whole or chaffed, to counteract the purging effects of the young grass. Cows about to calve, if over fat, should be put into a paddock in which the feed is not too abundant. Newly-calved cows should be fed liberally to stimulate milk flow. Cows may now be served for autumn calving. Calves should be provided with warm, dry shed and liberally fed. Keep feeding utensils scrupulously clean to avoid digestive complaints.

PIGS.—Supply plenty of bedding in warm, well-ventilated styes. Keep styes clean and dry. Store pigs should be placed in fattening styes. Sows in fine weather should be given a grass run.

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  (*b*) On dry, stony, hard soils.
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(12) An excellent plant for Bees, making white honey.
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Greater Bird's-Foot Trefoil *(Lotus Major)*

It is enormously productive, very nutritious, and eaten with great relish by all stock. It is not easily injured by drought; does well on any soil in moist localities, and luxuriates on peaty soils. This is a splendid plant to establish in forest or rough country, on bush burns, and in rough swampy lands. It is one of the greatest butter-fat producing plants known. Sow 5 lb. of seed to an acre. **4/- lb.; 3/9 lb. in 28-lb. lots or more.**

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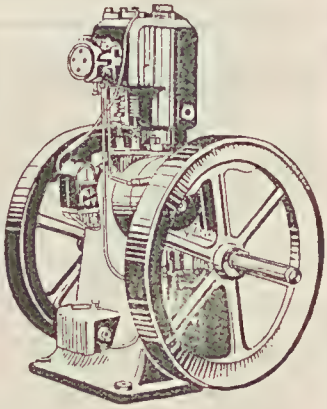

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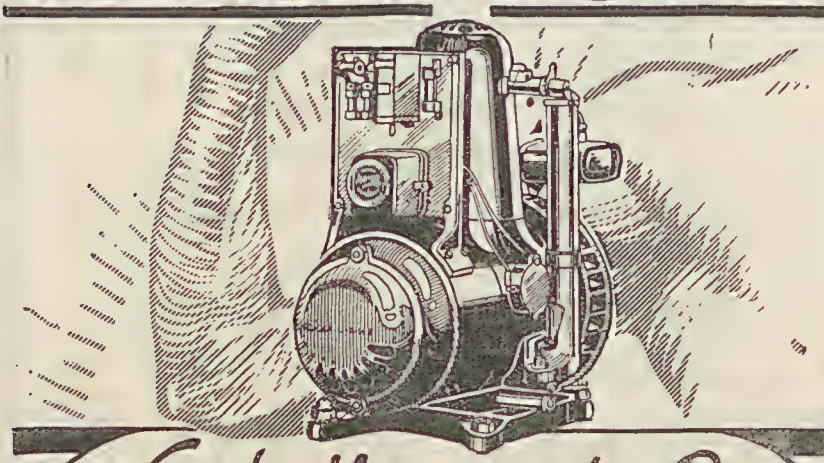

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FRIESIANS FOR SALE

(1) Bull Calf *ex* Dominion Hyacinth (374)

Dropped 29th August, 1923

Sire: **Victoria Songboy (359)** by Dominion Domino Dutch Boy (73 F.H.B.A.), *ex* Dominion Madrigal (371 F.H.B.A.).

Sire of Dam: **Oak de Kol 2nd Homestead Fobes** (imp. to N.Z. from America) (341 N.Z.F.H.B.).

Dam's Record for 273 days under Government Herd Test—
11,512 lb. Milk, 4·08 Test, 479 lb. Butter Fat.

For Full Lactation Period—
13,898 lb. Milk, 4·24 Test, 589 lb. Butter Fat.

(2) Bull Calf *ex* Victoria Oakdale Lassie (996)

Dropped 24th September, 1923

Sire: **Victoria Jo Patch (345)** by Longbeach Big Patch (515 N.Z.F.H.B.), *ex* Dominion Madrigal (371).

Sire of Dam: **Dominion Oakdale (342)** by Oak de Kol 2nd Homestead Fobes.

Vict. Oakdale Lassie is now undergoing her 1st test.

Her Dam, Dominion Proud Lassie's Record for 273 days under Government Herd Test—
11,336 lb. Milk, 3·42 Test, 387 lb. Butter Fat.

For Full Lactation Period—
12,216 lb. Milk, 3·51 Test, 428 lb. Butter Fat.

(3) Bull Calf *ex* Dominion Woodnymph (988)

Dropped November, 1923

Sire: **Victoria Jo Patch (345)** by Longbeach Big Patch (515 N.Z.F.H.B.), *ex* Dominion Madrigal (371).

Sire of Dam: **Woodcrest Jo** (imp. to N.Z. from America) (334 N.Z.F.H.B.).

Dam's Record for 273 days under Government Herd Test—
10,610 lb. Milk, 3·17 Test, 336 lb. Butter Fat.

For Full Lactation Period—
13,240 lb. Milk, 3·31 Test, 439 lb. Butter Fat.

The record of the dam—DOMINION MADRIGAL—of the sires "Victoria Songboy" and "Victoria Jo Patch" for 273 days under Government Herd Test is 11,373 lb. Milk, 3·93 Test, 448 lb. Butter Fat; and for Full Lactation Period 13,485 lb. Milk, 4·17 Test, 563 lb. Butter Fat. "DOMINION MADRIGAL" is a full sister to "DOMINION QUEEN MERCEDES," third cow of all breeds under Government Herd Test 1923, and Winner "Weekly Times" Butter Competition, Melbourne Royal Show 1923, and Champion Melbourne Royal Show 1923.

(4) Cow "VICTORIA DUTCHMAID" - 4 years old
Sire: Dominion Domino Dutch Boy (73). *Dam:* Dominion Milkmaid (370).

(5) Heifer "VICTORIA BELLONA" - - 3 years old
Sire: Dominion Domino Dutch Boy (73). *Dam:* Dominion Belle Corona (369).

(6) Heifer "VICTORIA CORIANDER" - 3 years old
Sire: Dominion Domino Dutch Boy (73). *Dam:* Dominion Coringa (380).

Inspection of above Bull Calves and Heifers at the State Research Farm, Werribee, is invited.

Application for Purchase to—

DR. S. S. CAMERON, Director of Agriculture, MELBOURNE

DEPARTMENT OF AGRICULTURE, VICTORIA

Red Poll Dairy Herd

The Department has now completed the orders for calves that were booked ahead of calving when the advertisement was withdrawn; consequently the booking of orders for bull calves from the forthcoming calvings has now been resumed.

BULL CALVES are sold for delivery at a month old at prices based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter ***fat*** yielded. Thus a calf from a cow with a 400 lbs. butter fat record is sold for 20 guineas, one from a 300 lb. butter fat cow for 15 guineas, and so on. Bull Calves *ex* heifers on their first calf are sold for a set price of 10 guineas.

(For Record of Yields of dams see Red Poll Herd Book.)

The Bulls in Use include—

VICE REGAL (95 A.A.)

Sire: Nicotine (69 A.A.). Dam: Velveteen (Imp.) 22875 (2 A.A.).

VICTORIA VOLCANO (322 A.)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).

Dam: Tonga (253 A.) by Honingham Archbishop (imp.) 9702 (48 A.A.).

Tonga's butter fat yields for 6 successive lactation periods are as follow:—1916, 341 lbs.; 1917, 398 lbs.; 1918, 419 lbs.; 1919, 479 lbs.; 1920, 428 lbs.; 1921, 562 lbs.

BELLIGERENT (Imported) 11096 (8 A.A.)

Dam's Record (1st milking) 7144 lbs. milk.

Dam's	Dam's	,,	14533 lbs. milk	...	4	years average	12871	lbs. milk.
Sire's	Dam's	,,	10370	,,	...	7	,,	,,	9354	,,
Sire's	D. Dam's	,,	9510	,,	...	12	,,	,,	8033	,,
G. Sire's	D. Dam's	,,	10215	,,	...	7	,,	,,	9386	,,
G.G. Sire's	D. Dam's	,,	12565	,,	...	10	,,	,,	8853	,,
G.G.G. Sire's	D. Dam's	,,	10088	,,	...	2	,,	,,	9754	,,

Inspection of the Herd is Invited.

Visitors will be met at the Station on notifying the Manager, State Research Farm, Werribee.

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Its main use is for grazing green, or when matured as a dry feed. In addition it is a great soil improver and of great value in choking out undesirable weed growth.

It is only an annual, but as it produces most of its seed just below the surface of the soil (hence its name) it is in practice perennial, and once introduced and properly established it is permanent.

We recommend sowing in all mixtures of grasses at the rate of ½ lb. to 1 lb. per acre. Sown with cereal crops 2 lbs. per acre should be sufficient, while, if sown alone on properly prepared land, from 4 lbs. to 6 lbs. and even up to 10 lbs. per acre may be planted according to the quality of the land. Smaller sowings may be made if time is allowed for the Clover to spread, which it does very rapidly. Price on application.

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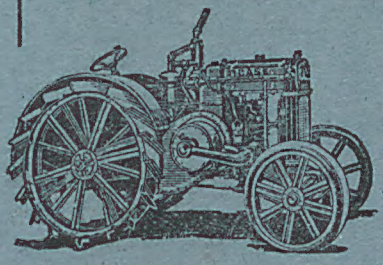

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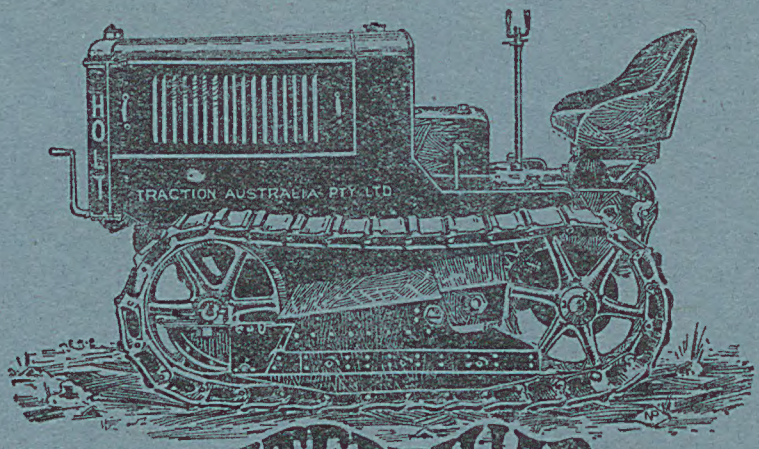

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